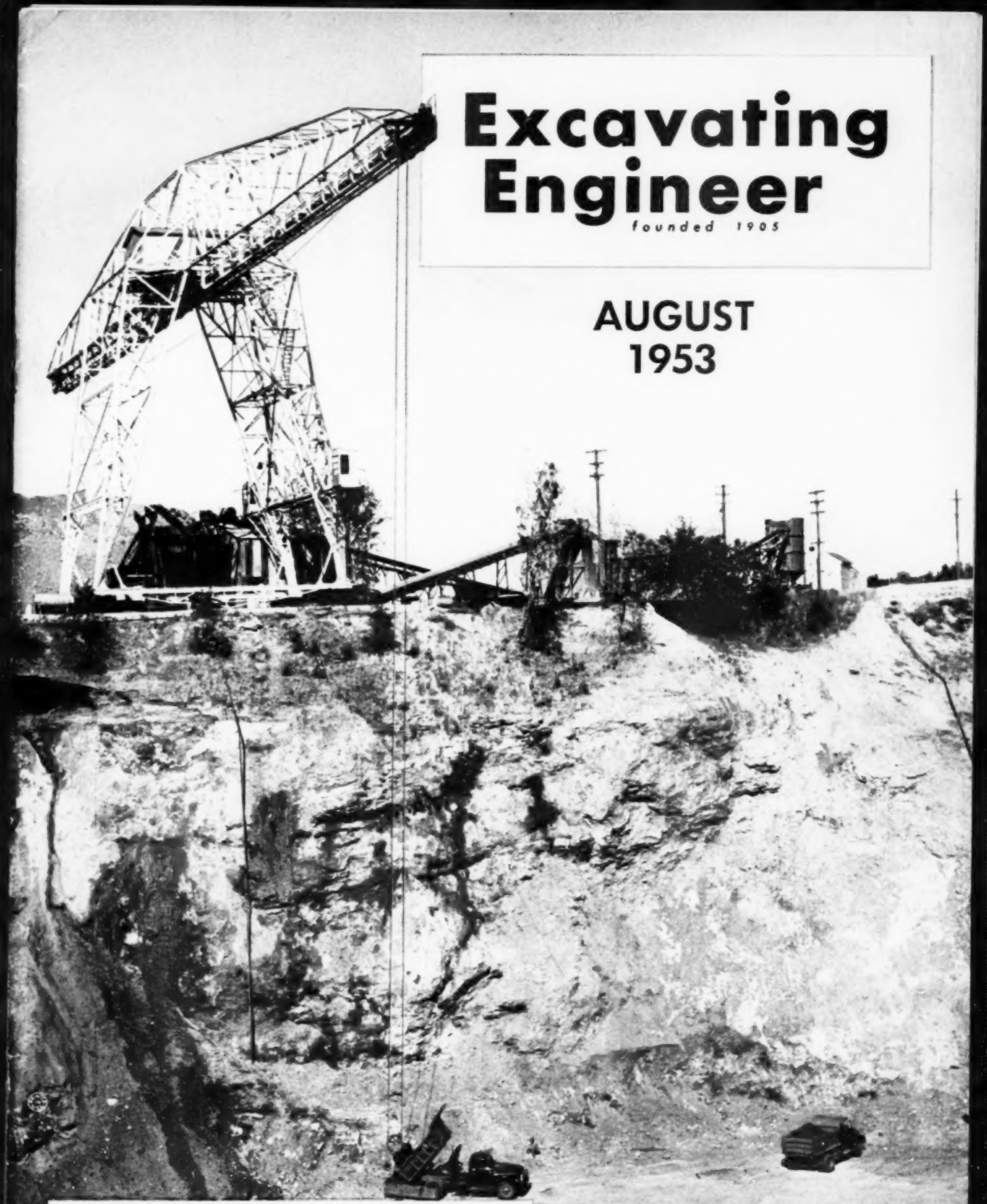
Excavating Engineer

founded 1905

AUGUST 1953



Once this 224-ton hammerhead crane poured the concrete for Bull Shoals Dam. Now the Quick Seven Mine near Joplin, Mo., hoists skips of zinc ore from its deep open pit with the rig. See page 16.

Here the Hydrocrane excavates for a retaining wall. Boom reaches out for extra passes — without moving truck an inch! Quick-set outriggers provide outstanding machine stability . . . even permit the ⅜-yd. clamshell bucket to be handled with a flat boom, fully extended. Every crane function fully hydraulic. Travels up to 50 mph on open road. Simple hand levers — no foot brakes.

BUCYRUS ERIE

HYDROCRANE'S built-in reach grabs the "EXTRA-DOLLAR" jobs

Bucyrus-Erie Hydrocrane with hydraulically telescoping boom gives you 8 ft. more boom — right at your fingertips. This special extend-re ract action means extra dollars in savings on regular jobs . . . extra dollars in profits on special jobs ordinary outfits can't handle. Look:

1. *On erection work* boom reaches between girders . . . hoists concrete buckets, planking, etc., to upper stories . . . saves hundreds of man-hours.
2. *On road work* telescoping boom reaches under branches, over obstructions while handling pipe, culvert, or levelling shoulders . . . moves material into tunnels and low underpasses . . . handles dozens of close-quarter jobs.
3. *On yard work* reaches into boxcars . . . over fences . . . between stockpiles to move material, load trucks, etc., in a hurry.

QUICK CONVERTIBILITY TO *HYDROHOE*

By actual stop watch test, crane has been converted to drag-shovel front end by one man in *less than one hour!* And on trenching, telescoping action of Hydrohoe boom cuts lost time moving up as much as 40 percent.

Get the full story on the all-hydraulic Hydrocrane with its many attachments.
SEND COUPON TODAY

Here the Hydrohoe starts a trench cut. Available with either 12- or 18-inch dipper—equipped with hydraulic ejector that kicks dirt out.

BUCYRUS-ERIE COMPANY
SOUTH MILWAUKEE, WISCONSIN

BUCYRUS-ERIE COMPANY
South Milwaukee, Wisconsin

Gentlemen: ☐ Please send me Hydrocrane literature.
☐ Please send me Hydrohoe literature.

Name .....

Company .....

Address .....

City ..... State .....

3H53

If you STALL—profits STOP!

WHEN a tire fails to *grip* and take you through, you lose time and money. When a tire "dies" on the job, men and equipment stand idle, profits disappear.

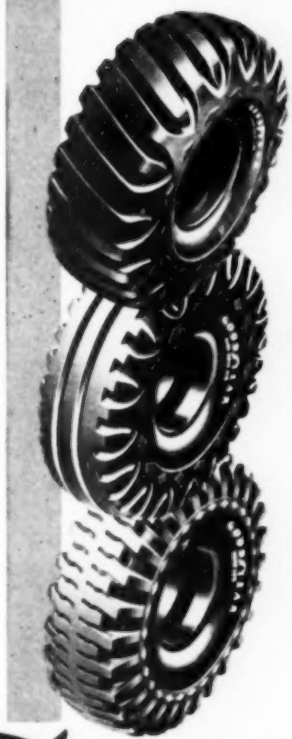
That's why the *only* tires you can afford are the best *workers*—the ones that can take on tire-killing jobs, day in, day out—and keep going!

Only worlds of experience can build such tires—*and Goodyear has it*—for Goodyear has built more tires for more uses than anyone else on earth!

This enormous, unequaled experience gives Goodyear a *practical* approach to your tire problems that means better pull and longer wear. So why not protect *your* profits with the tires that have *proved* they pay their own way, day after day, on the toughest jobs on earth?

Goodyear, Truck Tire Department, Akron 16, Ohio

FOR EACH JOB, THERE'S A COST-CUTTING GOODYEAR TIRE!



You can't beat the
HARD ROCK LUG
for stamina and bruise resistance on jobs where rocks and snags ruin other tires.

You can't beat the
HARD ROCK RIB
for front wheels on all tire-killing service. Rugged—smooth rolling—easy steering.

You can't beat the
ROAD LUG
for toughness and super-traction OFF the road and long, smooth mileage ON the road.

Road Lug—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

GOODYEAR

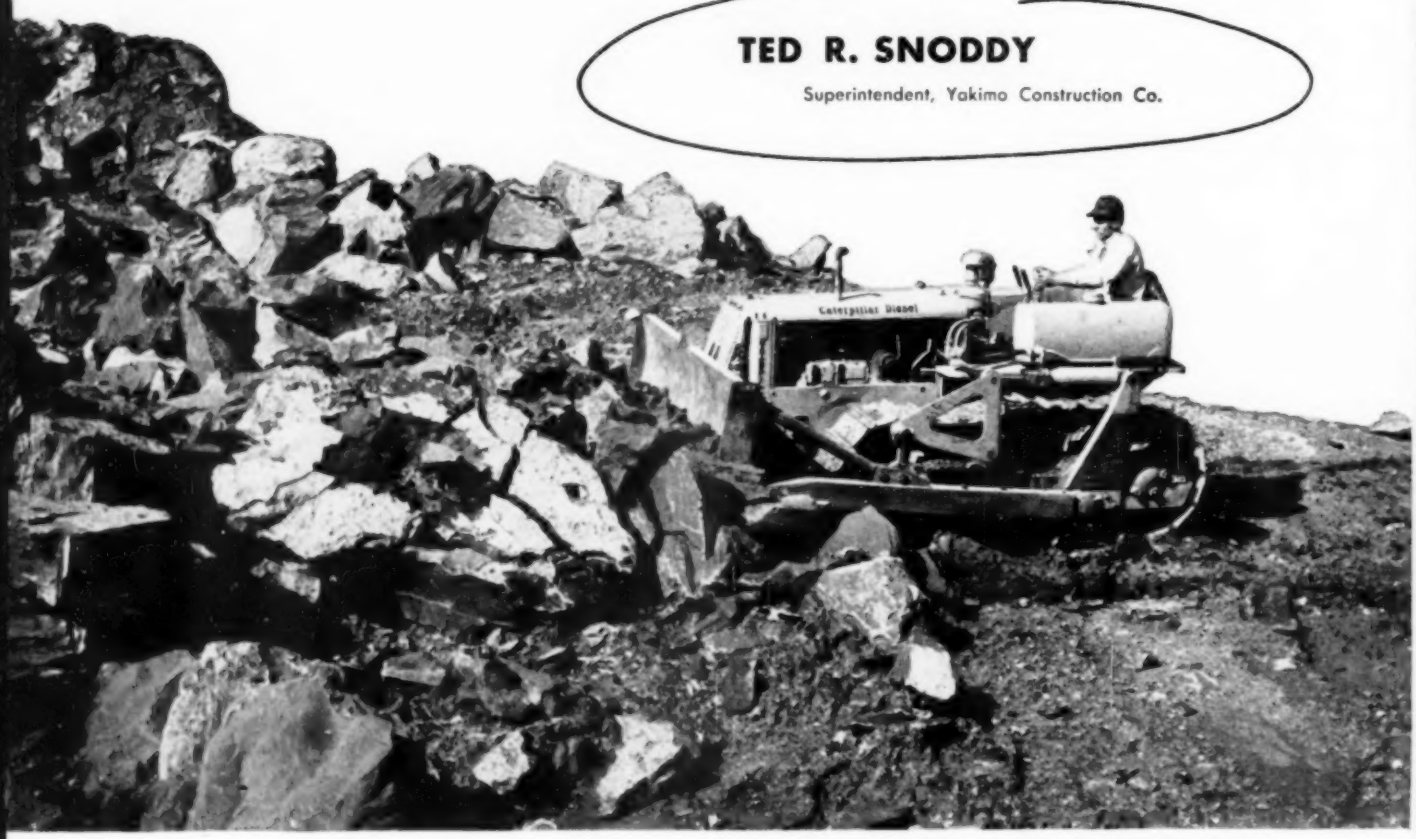
MORE TONS ARE HAULED ON GOODYEAR TRUCK TIRES THAN ON ANY OTHER KIND

"When I bought this CAT* D4 Tractor, it took the place of 20 men.

"It saved me about $100 a day on expenses.

"This tractor has paid for itself about four times and no repairs."

TED R. SNODDY
Superintendent, Yakimo Construction Co.



A Caterpillar D4 Tractor equipped with a No. 4S Bulldozer clears rock in the quarry for easy access by trucks. Owned by Yakimo Construction Co., Dallas, Tex., this equipment is working on the Blakely Mt. Dam, Mt. Pine, Ark. The Yakimo Construction Co. has the rock job for the 4,500,000-yard dam.

What else is there to say?

The money-saving performance of this Caterpillar D4 Tractor and No. 4S Bulldozer speaks for itself. Ask your Caterpillar Dealer for a profit-building demonstration on *your* job.

Caterpillar Tractor Co., Peoria, Illinois.

CATERPILLAR*

*Both Cat and Caterpillar are registered trademarks—®

NAME THE DATE... YOUR DEALER WILL DEMONSTRATE

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Excavating Engineer

founded 1905

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Jaeger-Air now speeds operation

the fastest drilling team on wheels

Motorized for rapid movement. Each drill powered with 365 cu. ft. of air for top speed drilling and blowing

To work his 20 quarries, widely spread over five counties, Perry Jones, Carbondale, Kansas contractor and quarryman, devised this motorized fleet. The Jaeger "new standard" 365 ft. compressors are on Model 6500 Chevrolet trucks. The Thor 4" wagon drills, with enough mast for 12 ft. steel change, are on Case tractors.

Each compressor, with its drill, is a self-sufficient mobile unit, permitting the most flexible use of the equipment.

Rock ledges vary in depth up to 23 ft. The additional air delivered by the 365 ft. Jaeger compressors makes it possible to hold full 90 to 100 lbs. pressure at the tools for maximum efficiency in both the drilling and the hard blowing required. The 315 ft. compressors, previously used, could not maintain this full pressure.

Other Jaeger "new standard" capacities — 75 - 125 - 185 - 250 - 600 cfm — offer comparable opportunities to get greater production without increasing costs. See your Jaeger distributor, or send for Catalog JC-1.

"I am now operating my seventh consecutive Jaeger 'Air Plus' Compressor. This speaks for itself as to my opinion of the design and superior performance of these machines."

Perry Jones

THE JAEGER MACHINE COMPANY

553 Dublin Avenue, Columbus 16, Ohio

TRACTOR LOADERS • PUMPS • CONCRETE MIXERS • TRUCK MIXERS • PAVING MACHINES

AVOID

the little losses that can break you . . .

BUY A NORTHWEST

SMALL breakdowns and adjustments mean small losses but small losses total into large losses and nick real holes in the profit on the job,

That's just another of the many differences between Northwest equipment and others—you are free from the constant annoyance of ever recurring minor adjustments and small breakdowns that cut the output, delay the trucks and slow the job down.

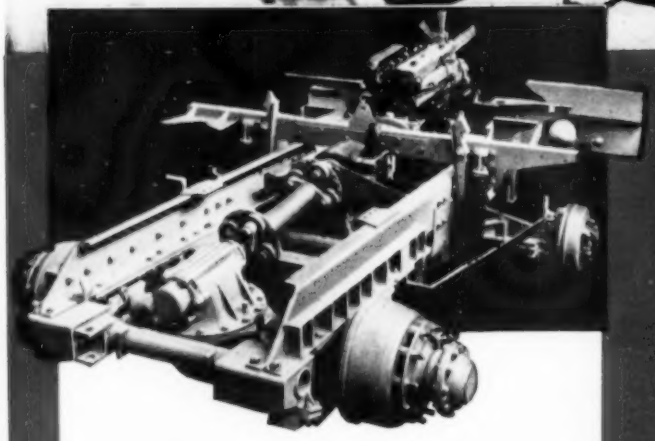
Northwests have proved their dependability on all classes of work. Northwest greater simplicity of design makes upkeep easy and reduces adjustments. Avoid the *little* losses that can break you! Plan now to have a Northwest. Talk it over with a Northwest man and follow the Northwest Crowd.

NORTHWEST ENGINEERING COMPANY
1506 Field Building, 135 South LaSalle Street, Chicago 3, Illinois

Successful Contractors Stay Successful with Proved Equipment

SHOVELS ■ CRANES ■ DRAGLINES ■ PULLSHOVELS

Strength with FLEXIBILITY



MASSIVE DESIGN RUGGED CONSTRUCTION

EQUALLY AT HOME ON ROAD OR SITE

There is no Dumper in the world like this British-built Muir-Hill 4½ yarder. Over twenty years know how is built into this—the most advanced unit in its field. Just off the press is a new Muir-Hill publication giving the whole story. Write us today for a free copy.

MADE IN ENGLAND

ENGINEERED for DURABILITY

This is a chassis built to stand up to the worst conditions which construction work can offer and will save dollars on maintenance and repair, just as the instantaneous gravity tip action saves time on the job.

The Muir-Hill 14B MODEL 4½ CU. YD. DUMPER

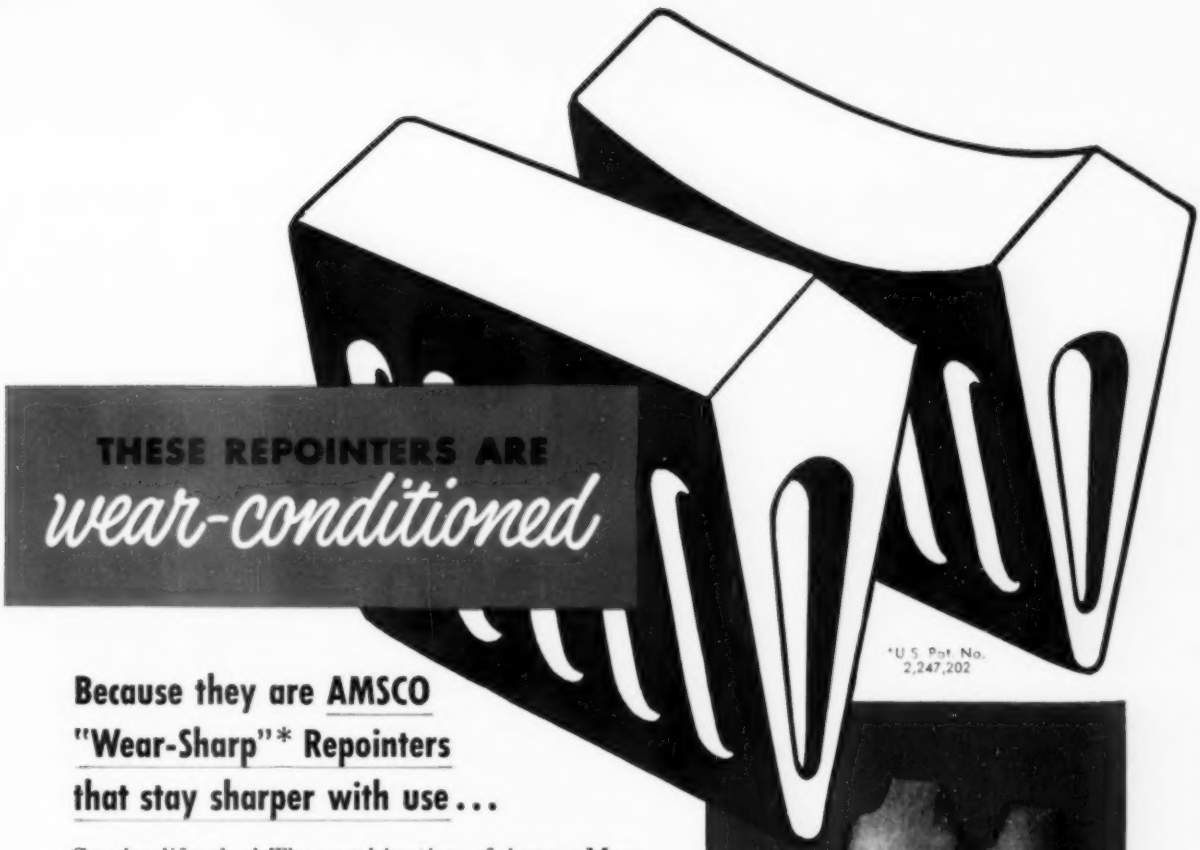
E. BOYDELL & CO. LTD., OLD TRAFFORD, MANCHESTER 16

Cables: 'Muirhil' Manchester 16, England

THE WORLD'S BIGGEST DUMPER BUILDERS

dm EB 194

THESE REPOINTERS ARE *wear-conditioned*



*U.S. Pat. No. 2,247,202

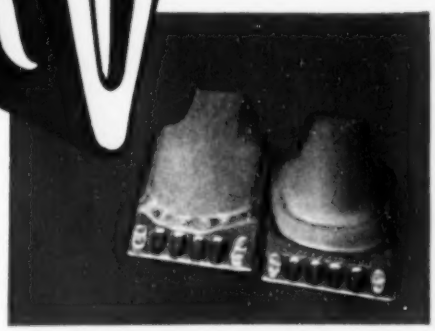
Because they are AMSCO "Wear-Sharp"* Repointers that stay sharper with use...

Service life plus! The combination of Amsco Manganese Steel and the hardness of AMSCOATING with Amsco Hardfacing electrodes—gives you a tooth that wears evenly and stays sharp longer.

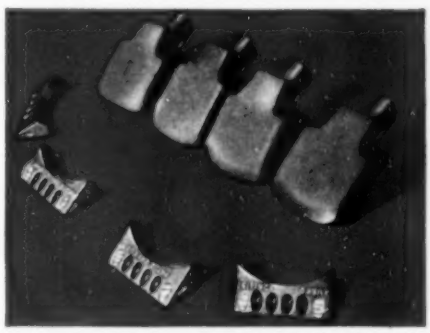
Note that only certain grooves (shown in red at left) are Amscoated—the grooves on the outside and the one on each end. This is the area where ordinary teeth wear fastest. The hardened corners on the "Wear-Sharp" equalize wear along the entire cutting edge and eliminate rounded, blunted corners that cut digging speed and waste power.

Field reports indicate that "Wear-Sharp" repointers will give as high as six times the life of other teeth.

In these photographs at right of a typical case history, old repointers lasted from three to four days. Amsco "Wear-Sharp" repointers lasted 32 days—eight times the service life of the repointers previously used.



"Wear-Sharp" repointers installed on two dipper teeth showing condition of old teeth.



Notice the even wear on these teeth after 257 hours of use with "Wear-Sharp" repointers used. New "Wear-Sharps" are ready for installation.

AMERICAN Brake Shoe COMPANY

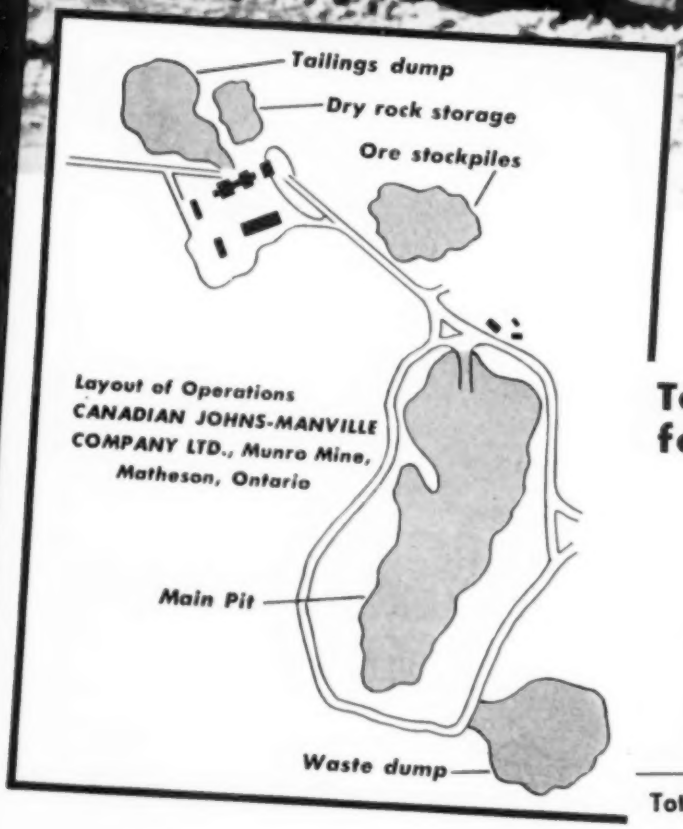
AMERICAN MANGANESE STEEL DIVISION

373 EAST 14th STREET • CHICAGO HEIGHTS, ILL.

Other Plants: New Castle, Del., Denver, Oakland, Cal., Los Angeles, St. Louis. In Canada: Joliette Steel Division, Joliette, Que.
Amsco Welding Products distributed in Canada by Canadian Liquid Air Co., Ltd.

JOHNS-MANVILLE uses

Tournatractor cleans snow from pit floor. Note good condition of tires after 3000 hours work on abrasive, rocky materials.



Layout of Operations
CANADIAN JOHNS-MANVILLE COMPANY LTD., Munro Mine, Matheson, Ontario

Tournatractor "time-table" for typical month's work

• Dozing ore to crusher, cleaning around 4 shovels, maintaining ore stockpile	238 hrs.
• Maintaining tailings dump	87 hrs.
• Maintaining waste dump	62 hrs.
• Towing equipment	43 hrs.
• Plowing snow	62 hrs.
• Odd jobs	43 hrs.
Total working time for month	**535 hrs.**

High-speed, rubber-tired excavating • hauling

Tournatractor *on mine maintenance*

On tailings dump, "C" moves up to 3 cu. yds. per load. With big 21.00 x 25 low-pressure tires and 4-wheel drive, rig has plenty of flotation and traction in the soft, loose footing.

Canadian Johns-Manville Ltd., the world's largest asbestos producer, works a 19 mph, rubber-tired C Tournatractor on mine maintenance at their Munro open-pit near Matheson, Ontario.

Their 186 hp "C" works 24 hours per day, 6 days per week, handling scattered jobs. During a typical 24-hour period, rig maintains stockpile and dozes ore to crusher . . . cleans up for three 2½-yard shovels and one ¾-yard shovel . . . maintains tailings and waste dumps . . . clears gabro rock and wet blue clay overburden . . . tows compressors, wagon drills and other mine equipment. Unit moves from job to job without delay.

With Angledozer blade at full 20° angle, Tournatractor clears path 12' wide in one pass. Grade is 7% . . . temperature, 37° below zero. Rig often worked in temperatures of 50° below.

Plows 26 mi. of road in 6¾ hrs.

In addition to this regular mine maintenance, Tournatractor also plows snow. After one heavy snow, rig traveled 30 miles and cleared 26 miles of road in 6¾ hours! First, it opened the highway from the mine to the nearby town of Holtyre (8 miles). Then, it returned 4 miles over the same road to an intersection . . . plowed the road to Matheson (7 miles) . . . cleared city streets and company warehouse grounds there . . . and returned 11 miles to the mine, widening road it previously opened.

95% efficient over 3000 hours

At other times during the winter, the "C" plowed and maintained haul roads, helped pull shovel up steep grades on moves from pit to pit, and did odd jobs around the shop. In 3,000 working hours, Tournatractor recorded a 95% mechanical efficiency.

Why not find out for yourself how Tournatractor's 19 mph speeds on rubber can get more work done, at lower cost per job? Call your LeTourneau Distributor for a demonstration on your job at no obligation.

Tournatractor's ability to make self-powered moves anywhere at speeds up to 19 mph provides quick service to all parts of the Munro Mine . . . which processes 2,000 tons of rock through mill daily.

Angledozer—Trademark Reg. U. S. Pat. Off. Tournatractor—Trademark D-204-M

• **lifting equipment**

LeTourneau-Westinghouse Company

PEORIA, ILLINOIS

ENGINEERING REPORTS:

OPERATING ECONOMY and flexibility are two advantages of using G-E drives at plant's key points. Aggregates are blended in bin, fed into dryer by elevator, then lifted to top of tower by elevator for screening. Dried aggregate is batched and deposited in mixer, where asphalt from tanks at left is also introduced, then mixed and discharged into trucks.

Asphalt plant electrified for portability, high output

G-E drives simplify operation of 125-ton-an-hour Heldenfels Bros. plant; no repairs needed in two years

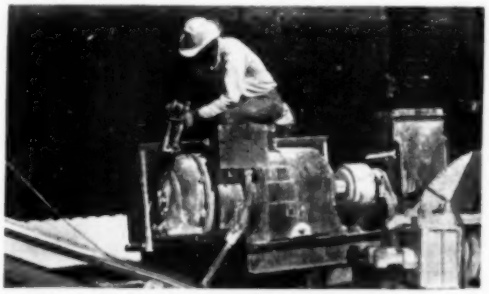
This portable motorized asphalt plant—owned and operated by Heldenfels Bros. Co. of Corpus Christi, Texas, and built by Iowa Manufacturing Co., Cedar Rapids, Iowa—is largest in the area. Key to its 125-ton hourly output—approximately twice as much as non-motorized plants—is simplified operation and portability, made possible by co-ordinated General Electric motors and control. Plant is easily broken down for relocation. And, says Mr. F. W. Heldenfels, "not one cent has been spent for electrical repairs in over two years of continuous operation."

The plant's G-E drives provide operating reliability, plus one-man control. The gear-motors, small and light considering their power, take up minimum space, and are remounted quickly. Over-all plant weight is reduced, flexibility added.

For faster, easier, more efficient operation of *your* construction equipment, electrify with G-E drives and power distribution equipment—backed by G-E engineering help in application, installation and service. General Electric, Schenectady 5, N.Y.

1878 75 1953 YEARS OF ELECTRICAL PROGRESS

664-29



EASY TO RE-LOCATE G-E motors and control, like this 50-hp totally enclosed gear-motor, can be quickly transported by truck from one job to the next.

ONE-MAN CONTROL of plant's production is possible with G-E remote control panel in tower, from which dryer, elevators and conveyors are operated.

Engineered Electrical Systems for Heavy Construction

GENERAL ELECTRIC

DIGGING — Contractor Del Balso of Bronx, N.Y., keeps his Model HM profitably busy. Here it's lowering grade for a new pavement . . . easily cutting the many tree roots encountered.

LOADING — Model HM doing a fast loading job on a dirt pile for Davis Construction Corp., Long Island. Fast reverse speeds and power boosted steering give this "PAYLOADER" high production on loading work.

BACKFILLING—A very popular "PAYLOADER" use is trench work — loading excess dirt and backfilling the trench. Tires do not injure pavements and the bucket can backfill over the top of sheeting or other obstructions.

SPREADING — On the Penn-Lincoln Parkway near Pittsburgh, Frank Mashuda's Model HM spreads shoulder material while concrete pouring goes on beside it. Good tire flotation and maneuverability is an important HM asset here.

MASTER OF MANY JOBS

Big 4 wheel drive "PAYLOADER" tractor-shovels are capable *and* versatile — able to do *many* jobs and drive quickly from one job to another at speeds of 17 m.p.h. Big tires, plus 4-wheel-drive, gives them catlike traction and flotation to surmount poor ground conditions. Power boosted rear wheel steer makes them maneuverable and easy to handle . . . 4 gear ratios in each direction provide the right speeds to fit each task.

The powerful 1½ cu. yd. "PAYLOADER" is the flagship of the "PAYLOADER" fleet, which includes 7 sizes down to 12 cu. ft. bucket capacity. Also a choice of 4 wheel drive, rear wheel drive and front wheel drive to best fit your needs. Your Hough Distributor, one of 200 in the U.S. and Canada, is ready to serve you *right* — with extensive application experience and complete parts and service facilities. The Frank G. Hough Co., 703 Sunnyside Ave., Libertyville, Ill.

WRITE for full information on any of the "PAYLOADER" models: FourWheel Drive HM — 1½ yd. and HR — 1 yd.; Rear Wheel Drive Models HY — 1¼ yd., HF — ¾ yd., HE — ½ yd.; Front wheel drive Models HAH — 15 cu. ft., HA — 12 cu. ft.

SAY "HUFF"

PAYLOADER®

THE FRANK G. HOUGH CO. SINCE 1920

You pick the job!

WHAT's the toughest blading operation you've got? Ditching? Bank-sloping? If you want to see it done better, easier, with more work output per hour, watch a Cat* Motor Grader handle it.

Watch the operator change through the full range of blade positions in one minute without leaving his seat! Get into the seat yourself! Notice how the operator has a full view of his work without standing up. Check the steady production with no stops for adjustment.

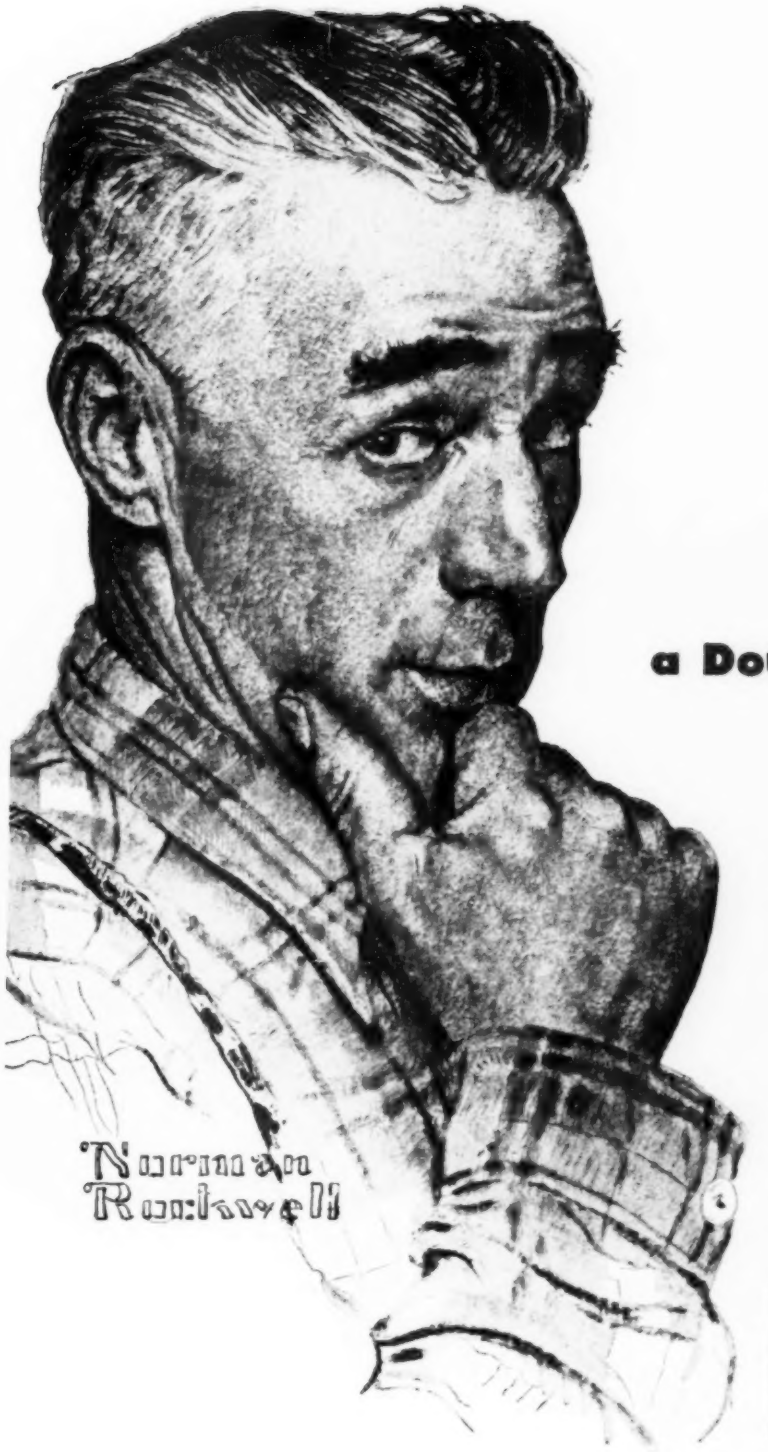
Your Caterpillar Dealer is ready to demonstrate any of the three models—No. 212, No. 112, or No. 12. Fair enough? Call him today.

Caterpillar Tractor Co., Peoria, Illinois.

CATERPILLAR*

*Both Cat and Caterpillar are registered trademarks—®

**NAME THE DATE...
YOUR DEALER
WILL DEMONSTRATE**



You?...

a Doubting Thomas?

IF YOU'RE a man who has to be shown, we're right in your corner. Just give Roebling "Blue Center" Steel Wire Rope one try... see for yourself how it saves time and costs you less on the job.

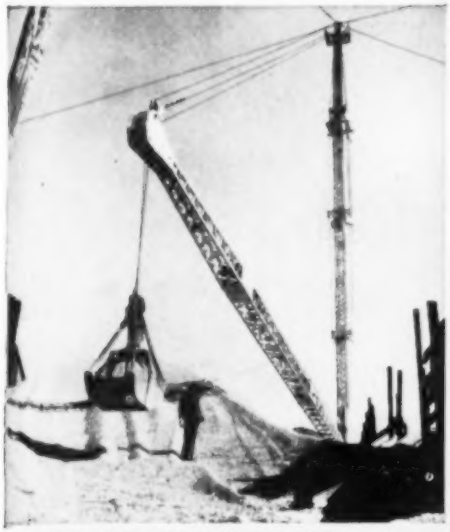
Two out of three wire rope users in excavating and construction prefer Roebling rope. Call the nearest Roebling office for a Field Man to suggest the best ropes for your purposes.

ROEBLING CF&I

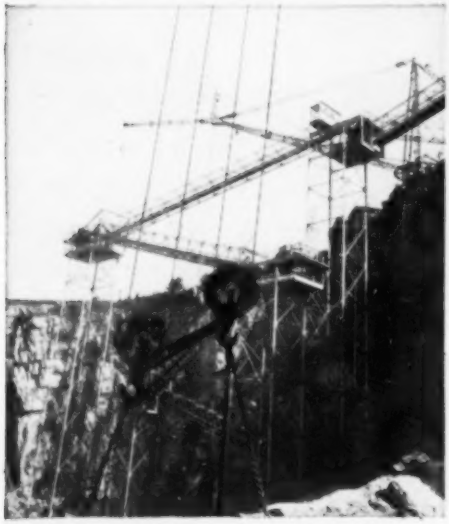
A subsidiary of The Colorado Fuel and Iron Corporation

JOHN A. ROEBLING'S SONS CORPORATION, TRENTON 2, N. J. BRANCHES: ATLANTA, 934 AVON AVE. • BOSTON, 51 SLEEPER ST. • CHICAGO, 5525 W. ROOSEVELT RD. • CINCINNATI, 3253 FREDONIA AVE. • CLEVELAND, 13225 LAKEWOOD HEIGHTS BLVD. • DENVER, 4801 JACKSON ST. • DETROIT, 915 FISHER BLDG. • HOUSTON, 6216 NAVIGATION BLVD. • LOS ANGELES, 5340 E. HARBOR ST. • NEW YORK, 19 RECTOR ST. • ODESSA, TEXAS, 1920 E. 2ND ST. • PHILADELPHIA, 230 VINE ST. • SAN FRANCISCO, 1740 17TH ST. • SEATTLE, 900 1ST AVE. S. • TULSA, 321 N. CHEYENNE ST. • EXPORT SALES OFFICE TRENTON 2, N. J.

At this granite quarry..

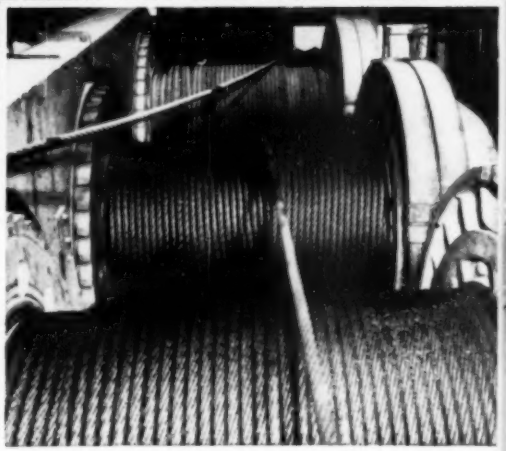


TINY PARTICLES OF GRANITE DUST are constantly grinding away the wire ropes on this Storage Derrick. But ⅝" Tiger Brand Ropes have averaged many years of good service in spite of this severe abrasive action.



SAFE AND SOUND after years of continuous service. That is the amazing record of the ⅝" Tiger Brand Ropes on this cableway, which is used to move workers in and out of the quarry.

THE WESTON & BROOKER COMPANY likes Tiger Brand Wire Ropes because they meet the stiff operating requirements and do every job economically.



Tiger Brand Wire Ropes have been used 29 years!

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Dozers keep haul roads smooth for good trucking. In background, Bucyrus-Erie 200-W walking dragline strips overburden.

Construction Crane Gives Open-Pit Mine New Efficiency

Missouri's Quick Seven, a deep zinc-lead pit with steep sides, presented tough hoisting problem until it brought in a 224-ton hammerhead crane with a 300-foot reach.

HEAVY construction know-how has long been an important element in efficient open-pit mining. In fact some top open-pitters of today got their start as contractors. The reopening of the Quick Seven mine near Joplin, Mo., last year as an open pit operation provides a good "reason why."

There are a number of shallow zinc-lead deposits in the area, most of which have been worked underground by small operators for about 70% recovery. Cover is shaley, soft ground and previous mining was largely by a "pull hole" modified caving system. The Quick Seven mine being worked today by a joint venture of Brown and Root, Inc., Houston, Tex., and American Zinc, Lead and Smelting Company, St. Louis, Mo., is located on the north

banks of the North Fork of Spring River, two miles northwest of Neck City, Jasper County, Mo.

Last significant tonnage recovered at Quick Seven was in 1918. In 1948, F. W. Evans, Joplin mine owner and operator, test-drilled the property with churn rigs. Brown and Root acquired leases on 60 acres of property on a royalty basis shortly thereafter. When the firm started its own churn drilling in 1951, American Zinc became interested and joined Brown and Root on the project. The joint venture purchased 60 acres for the concentrating mill site.

The high clay content of the ore makes the partnership particularly appropriate. Brown and Root, long experienced in mud work, has taken charge of the mining, crushing, and preliminary washing. American Zinc, rock mining experts, run the concentrating mill. The joint staff, headed by American Zinc's Tri-State Manager John J. Inman, includes Geologist Dan R. Stewart, Mill Superintendent Jack Gilbert, and Mine Super Pope Schoenberger.

Tests Show Deep Sink Hole

Test drilling clearly delimited the Quick Seven orebody to a circular sink hole area 500 feet in diameter with a maximum depth of 185 feet. Walls are nearly vertical, of limestone, chert, and some Pennsylvania shale. The orebody is in non-uniform layers interspersed with shale and clay. It was apparent early that a low-cost mass-production system of mining was called for.

Excavation itself presented no particular problems—other than close separation of ore and waste. Getting the ore out of the deep pit was another matter. Any kind of a haul road, conveyor-way, or shipway was undesirable because of the large waste cut (or pillar of ore) which would be required. The answer seemed to lie in a crane which could reach well over the pit edge, execute high lifts up to 15 tons, and dump at a safe distance for crushing machinery to be located.

Brown and Root engineers remembered the 224-ton hammerhead crane which was then winding up its concrete-pouring work at Bull Shoals Dam, Arkansas. This rig with its 300-ft. reach offered nearly all the desired features. Its long arm would extend well over the pit, and a skip could be lowered from any point along the outboard arm. The crane could hoist efficiently from any depth to the maxi-

Pope Schoenberger, Quick Seven super, believes in neat job site.

Below: Two Ingersoll-Rand X-71 wagon drills are on assignment.

Bottom: Bucyrus-Erie dozer on TD-24 crawler shoves overburden.

mum contemplated and could move parallel to the pit edge at will.

Brown and Root started shipping in equipment the first week of January 1952. A 6-yd. Bucyrus-Erie 200-W walking dragline with 125-ft. boom was brought from a canal job which it had just finished at Beaumont, Tex. The big excavator, which had to be broken down for shipment, was reassembled and started work in early February. Its first job was a bit unusual—the rig was used as a crane to set up the 110-ft. high bridge crane.

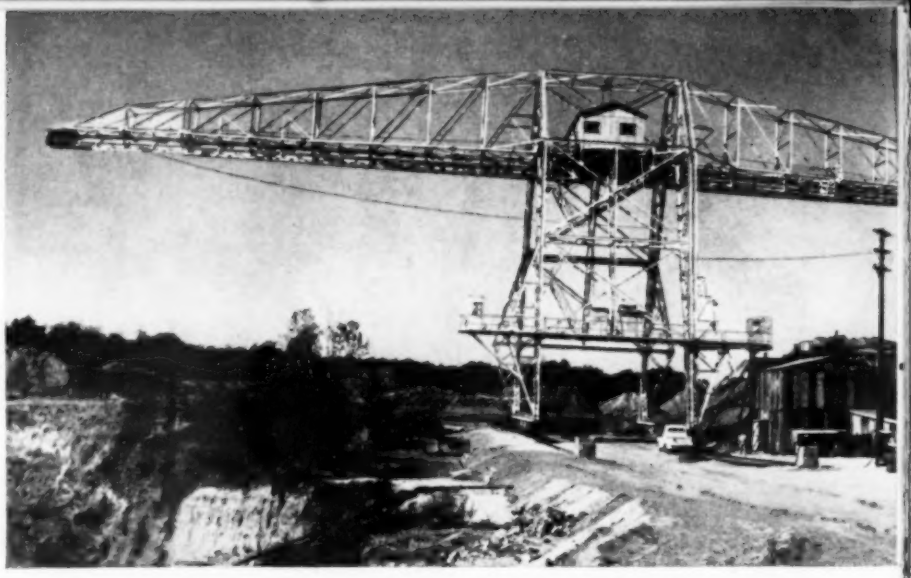
200,000 cu. yd. a Month

Its stint as a rigging crane completed in about 10 days, the 200-W went to work on the 500-ft. diameter pit, soon had it down 50 feet. In the first six months of operation, the dragline removed 400,000 cubic yards of overburden from the pit. Since this was rehandled an average of 2⅔ times, the actual yardage was about 1,100,000. Although yardages were difficult to compute because of the rehandling problem, Superintendent Schoenberger believes the 200-W has averaged 200,000 cubic yards a month on the job. The dragline works round the clock on a three-shift basis six days a week with a crew of three operators and three oilers.

The dragline digs the pit to 90 feet deep — unusual for a 6-yd. machine. For maximum efficiency, the machine was kept busy at 50 feet much of the time by truck-hauling waste to a high corner. Bottom waste was loaded out by the 1½-yd. shovel now used as an ore loader.

Maximum pit depth is 170 feet, diameter about 500 feet. About a third of the limestone-flint-shale overburden required blasting. Drills used on the job are two Ingersoll-Rand X-71 wagon rigs and an F-35 tripod drifter. The drills sink 2¾ to 1⅞-in. holes with Liddicote throwaway bits (abrasive character of the burden made resharpening of conventional bits impractical). Holes are loaded with 1¼ x 8 Hercomite No. 4 using electric caps and as many as seven delays. Drilling—usually on a 5 x 5-ft. x 18-ft. deep pattern—is difficult in the overburden fractured and broken in past underground work.

Main interest here is in the zinc content of the ore, which is lower in lead content. An old time miner who looks back to the days of 10 to 15% ores once mined here by underground methods would wonder how this operation can pay out now that the "cream" is gone. The answer is, of course, a high degree of mechanization facilitating an economical volume operation.



Ore processing at the mine is continuous process from 300-ft. long hammerhead crane, through crusher, screen houses to hopper (right). Conveyors are Robbins.

After the 200-W dragline strips the burden from the ore, a 1½-yd. Bucyrus-Erie 38-B shovel takes over as ore loader. It feeds three GMC trucks with 12-ton National Steel hopper bottoms. The trucks haul a varying short distance to a skip pan lowered down the pit side by the outboard arm of the hammerhead crane. The skip is sized to hold a 7-cubic yard truck load, whisk it out of the pit to dump to the crusher hopper.

The 38-B handles easily the maximum 2,500-tons-a-day capacity of the plant, has ample time to clean out waste pockets left after stripping and keep the pit in good order. This rig is more-or-less imprisoned in the deep pit. To get it out after the last dipper of ore is gone will be an interesting problem. Travel from the present sink hole to the North Pit—a few yards away—will require a tunnel (to be cut through an old drift) between pits. This will allow trucks to haul ore from the North Pit to "Quick Seven" via the tunnel for hoisting with the present setup.

Crane Hoists Out Trucks

Although the shovel is a full-time resident of the pit, the three trucks use the ore route to come up for shop servicing every week. The hammerheads 15-ton capacity makes easy work of hoisting a truck to ground level. This problem of servicing was one of the factors involved in the selection of 10-ton (instead of larger) trucks.

Active in pit work are two International TD-24 tractors with Bucyrus-Erie bulldozer equipment. These rigs not only keep the pit floor and haul roads clean and flat, but spend a good deal of time working with the stripping dragline. Because of the nature of the sink hole, some rehandling of overburden is unavoidable. The dozers save some rehandling by pushing back spoil cast up by the 6-yd. walker.

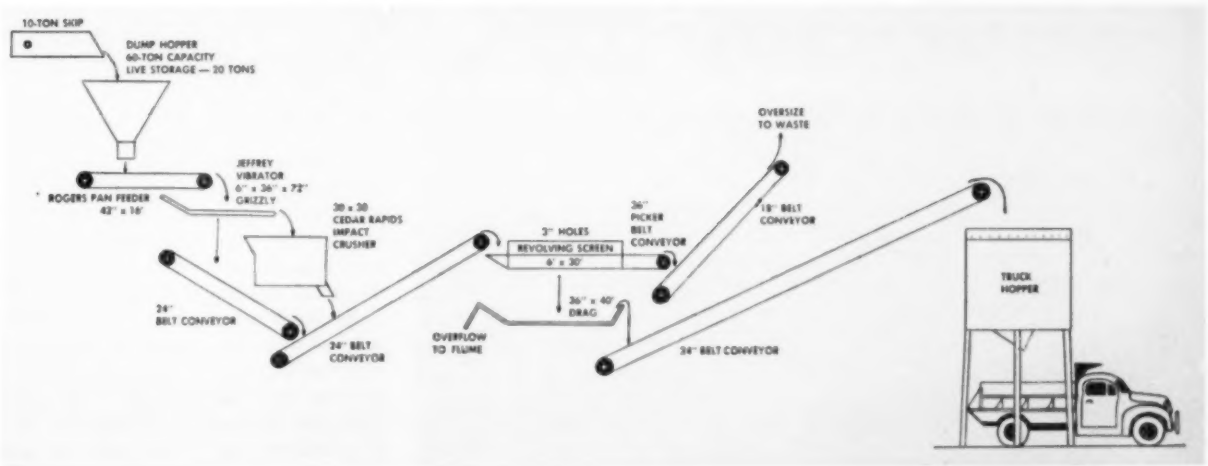
The shaley overburden is extremely abrasive. Dozer cutting edges wear down in about six weeks. Three buckets—two Hendrix and one Page—are needed to keep the 6-yd. dragline going—one bucket a week. Master Mechanic Joe Shedelbower has buckets and dozer blades rebuilt with Rainet type B rod.

The hammerhead crane dumps its 10-ton skip loads of ore to a 60-ton hopper mounted on a 42-in. x 16-ft. Rogers pan feeder. Material passes over a 6 x 36 x 72-in. Jeffrey vibrating grizzley to a 30 x 30-in. Cedar Rapids impact crusher (handles boulders up to 30-inches). Minus 6-in. crushed ore (and ore passing the grizzley) is conveyed on a 24-in. belt to a second hand 6 x 31-ft. dredge trommel screen. A 10-ft. long section at the feed end of the screen mixes and breaks the ore with lifter bars. The washing section of the trommel has 3-in. holes to drop undersize to a settling tank where it is reclaimed to a 100-ton ore bin by a dewatering drag conveyor. Trommel oversize spills to a picking conveyor for hand removal of ore—the bulk being waste is conveyed to a waste pile.

Like the big hammerhead, the 100-

Continued on page 48

Flow diagram shows ore processing at the mine. Crushed ore is truck-hauled to the mill ½-mile away on higher ground.



Off-center stub shafts on skip cause load to dump when weight is transferred from crane's sling to shaft supports on hopper.

In 115-ft. deep pit, 1½-yd. Bucyrus-Erie 38-B shovel loads 7-yd. GMC 642's with National Steel beds.

San Diego's Double-Barreled Aqueduct

by Robert J. Green

Second barrel of Southern California lifeline gets under way as contractors move in to lay the 75-in. concrete water pipe through mountains and farming flatlands.

ONE hundred miles southeast of Los Angeles, where the San Jacinto Mountains merge with farmlands in the vicinity of Hemet and Winchester, Calif., contractors and equipment have started Chapter II in the chronicle of San Diego's search for domestic water. Four contracts are now under way, and the fifth and final contract has been awarded with work to start soon. The four active jobs total 33.4 miles, and represent about half of the second barrel of the San Diego Aqueduct. Taking off from the main Metropolitan Water District Colorado River Aqueduct near Hemet, the new facility will bring additional water to the city near the Mexican border.

The first section was constructed between dates 5-18-45 and 11-24-47, under supervision of the US Navy Bureau of Yards and Docks. The location surveys and preparation of designs and specifications were made by the US Bureau of Reclamation. The Navy is still interested, because its big shore-based installations near San Diego are vitally affected by any water scarcity, and current contracts are partly under its supervision. Appropriations for the construction were made to the Navy. The US Bureau of Reclamation, however, has been designated as the engineering and construction agency. Other interested agencies, in addition to the Navy, include the Metropolitan Water District of Southern California and the San Diego County Water Authority.

The project is of particular interest to contractors in southern California because of the often tough excavation in unfavorable terrain, and because problems connected with the installation of 75-in. reinforced concrete pipe sections weighing 16½ tons are never easy.

Five Contracts Let

Active construction now under way covers three schedules, which were contracted at the first bid letting and one contract subsequently awarded. Schedule I of Specs. DC-3754 starts at a takeout structure at the small feeder reservoir near Hemet, and extends from Sta. 138+86 to 620+00, a distance of about 9.1 miles. This schedule is under contract to R. V. Lloyd

After dragline mucks out excavation, men fine grade trench bottom to insure level base for pipe.

Equipped with special facilities to unload 17-ton concrete pipe sections, Sterling truck rolls off another section.

& Co. of Coachella, Calif., who subbed most of the construction work to Peerless Concrete Pipe Corp. of Santa Ana, Calif. Schedule II of Specs. DC-3754 carries the new artery forward to Sta. 1146+60, and is being built by Engineering Constructors of Los Angeles. Schedule III of Specs. DC-3754 joins the previous contract and ends at Sta. 1901+60. It is being done by Johnson-Western, Inc., of San Pedro, Calif.

Contract for a steel siphon 48 inches in diameter across the San Luis Rey River, Stations 1901+60 to 1968+15, has been awarded to P. & J. Artukovich and M. Miller of Los Angeles under Specifications DC-3807. The construction of the southern half of the aqueduct covered by Schedules 1, 2, and 3 of Specs. DC-3822 and extending from Station N 1968+15 to Station S 34+26 has been awarded to the S. A. Healy Company of Chicago, Ill. This contract covers about 30 miles of 48-in. and 54-in. concrete pipe.

Peerless Job Typical

The Peerless subcontract is somewhat typical of the work in all three schedules of Specs. DC-3754 as work starts on the contracts farther south in the granite boulder-studded mountains, excavation should become considerably harder. Lloyd's $2.5 million contract extends largely through flat land at the foot of the San Jacinto Mountains, and includes furnishing the pipe, trenching, pipe installation, backfill, metering equipment at the reservoir, and appurtenant structures. No inference should be drawn that the excavation was all easy, however, because already at least 3000 feet of ditch has had to be blown loose by explosives before it could be dug.

Peerless Concrete Pipe Corp. is doing all the work in Lloyd's contract with the exception of carpentry connected with forming manhole and other structures in the contract. The pipe under this schedule will operate under a gravity head, and will consist of 16-ft. lengths of reinforced-concrete Lock Joint type pipe with steel slip joints and a rubber gasket. The pipe is being manufactured by American Pipe & Construction Co. of South Gate, Calif.

Jack Honberger, pipe joint crewman, cuts asphalt wrapping paper which holds joint grout when outer part of pipeline joint is filled with concrete.

In pit, 16 miles from job, a Wagner front-end scoop on a Ferguson tractor loads GMC dump truck with selected sand fill. Sand packs ditch to pipe mid-point.

Excavation to make room for the big concrete aqueduct was a sizable assignment, the cut averaging 9-ft. in bottom width and about ½:1 side slopes. Minimum depth of the trench was 10½ feet, and in some cases it will be necessary to dig down to 29 feet.

Very little clearing has been found necessary, because the Peerless job for the most part passes through lands previously cleared by farmers. Fence intersections present somewhat of a problem, because they must be closed up again just as soon as possible. There is also a crossing of the Southern Pacific Railroad, a crossing of California State Highway 74, and of minor county roads in the area. The railroad crossing will likely be a jacking job, but the county highways can be open cut.

Pipe Delivery Limited

The controlling factor on ditch excavation is a limit of 1120 linear feet of pipe delivery which American Pipe can deliver from its manufacturing plant, based on a weekly schedule. Since the winter rainy season extends well up into the month of March, Peerless officials have not scheduled more ditch excavation ahead than they can fill with concrete pipe readily. An open ditch in a heavy southern California winter rain might spell the difference between profit and loss; in fact, one such section which was hit by a sudden storm in December cost as much for finegrade preparation as it did for excavation, because two feet of muck had to be removed and replaced with compacted satisfactory material.

Peerless officials are therefore digging the ditch with the same Lima machine which places the pipe sections afterward. Rigged with a 60-ft. boom and a 3½-yd. Esco dragline bucket, the machine backs down the ditch line and casts excavated material over to the north side of the trench as it mucks out the dirt. The machine, in most average digging, will stay ahead of the pipe delivery by working three days a week, one eight-hour shift per day, on the excavation operation.

Most of the farmland digging is relatively easy, consisting of topsoil, sand, silt, and some gravel. There is considerable decomposed granite which underlies the area, and when it is encountered, the teeth on the big bucket smoke with heat as they are pulled through the half-solid material. By laying the slopes back slightly on the natural angle of repose of the material, the ditch has so far been perfectly safe for workmen, and no bracing has been required.

The rocky portion of the job lay near the south end at Winchester, so in view of the limited pipe delivery, Peerless officials decided to excavate that difficult 3000-ft. section as one of the first items of business. There was considerable solid granite through this section, along with easier formations such as shale, diorite, and some half-disintegrated granite. The ditch was located in a minimum-depth section, so it was necessary to blow loose only about 10½ feet of rock from the ground surface.

Powder holes were sunk on the center line, on the quarter point, and on

Pipe lengths are lowered in fine graded trench by a Lima crane. Bureau of Reclamation is main engineering agency for the pipeline which will water San Diego.

After long haul, GMC dumps select sand backfill at trench edge. Bucyrus-Erie clamshell spreads material on sides of pipe.

the edge-of-slope line. In general they were placed four feet apart. Two Schramm 365-cfm compressors furnished the necessary air, and four Ingersoll-Rand wagon drills handled the steel and bits. The formation was hard enough that Ingersoll-Rand Carset bits, with tungsten-carbide inserts, were used. These bits regularly produced about 800 feet of 2½-in. hole before they had to be sharpened, so the elimination of much bit changing to bottom a hole at the proper diameter was assured from the start.

The holes were column loaded with Hercules Hercomite 40% bag powder, and the center-line holes were equipped with instantaneous electric blasting caps and a stick of gelatin dynamite. The first row of holes outside the centerline were equipped with Atlas Rockmaster No. 1 delays. No. 2 delays were placed in the outer row of holes along the slope line. As a rule not more than 50 holes were detonated at one time, using an Atlas 50-cap electric blasting machine. The delays worked beautifully, shoving the side material over to the already-exploded center, giving extra breakage and bunching the material in a heap where the dragline could easily pick it up.

Even in this rocky material, the crews stayed out ahead of pipe deliveries. The excavated rock was removed and dumped in the same manner as ordinary dirt excavation. The only special consideration through this area was the undercutting of these sections nine inches below grade, and the backfill of this area with nine inches of select compacted material later on.

Following the dragline comes a finegrading crew and equipment. A Caterpillar D4 with a standard size bulldozer blade is lowered in the ditch by the dragline. It works back and forth, preparing the final grade to very close tolerances. Survey hubs are then set, and a 7-man labor crew finishes out the grade. The pipe laying crew often works ahead with finegrading, until 400 or 500 feet are prepared and accepted by the inspectors. Then the crew goes back to lay pipe the other half of the shift at high speed.

Manufacture, Delivery, Placing

At its South Gate yard, American Pipe & Construction Co. has as complete a line of concrete pipe manufacturing facilities as there is on the West Coast. The setup includes a concrete batch plant, jigs for fabricating the steel reinforcing cages, spinning equipment, welding equipment, and facilities for curing the sections rapidly as they come off the line. The plant was so loaded with other pipe manufacturing commitments when the San Diego Aqueduct job came up that the 1120-foot-per-week arrangement was set.

American uses a fleet of seven Sterlings, with special low-bed pipe trailers which carry one of the sections at a time. The trucks make two round trips per day between South Gate and the project. Each truck is equipped with a special winch, cables, and a hand brake, which allows each driver to unload the pipe without calling for a crane. The pipe sections are strung out along the ditch line, with special attention being paid to certain beveled ends where the pipe has to make a curve in a change of alignment.

Each section is picked up and placed by the Lima crane, which uses a double hook, a 3-part line, and cable slings to make the lift. By unloading the end of each pipe on a timber block, enough space is left under each section so that a workman can place the sling with ease.

The crane hangs on to each section until it can be guided into final position. The joints are, of course, cleaned thoroughly before the sections are lowered, and in addition, the patented rubber gasket is placed in a groove on the male end, and lubricated with soap. When the joints are slipped together, workmen anchor an eight-ton comealong two joints from the pipeline end and pull the new joint up tight. After a bit of practice this operation goes along rapidly, and one of the 16½-ton joints often goes down from start to finish in about four to six minutes.

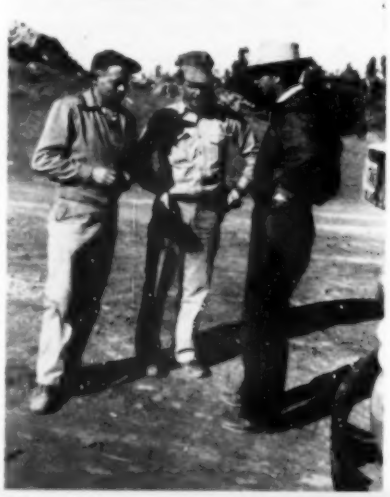
One of the most interesting parts of the job is the placement of backfill

With its 1¼-yd. clamshell, Bucyrus-Erie crane picks up sand backfill and dumps in even layers against the water pipeline.

by a remarkably efficient vibratory flooding method. This method is delivering densities in the select sand material as high as 117% of the compaction state in the pit from which the sand is taken.

The first step in the placement of this backfill consists of a select sand fill, which is placed up to the spring line of the pipe. This select material comes from a borrow area in the San Jacinto River bottom located from 3 to 15½ miles away from the reach of pipeline covered by schedule No. 1. Materials excavated from the trench are suitable for the select consolidated backfill on all other schedules. It is loaded to GMC 10-yd. dump trucks by a small Ferguson-mounted Wagner front end loader, hauled to the site, dumped, and placed very carefully to make an even lift by a Bucyrus-Erie machine equipped with a 1¼-yd. Williams clamshell bucket. The Bucyrus-Erie crane has a 60-ft. boom, with plenty of power to swing the material out to the far side of the aqueduct pipe. When the sand backfill goes in, each joint is fully protected from dirt by a tight wrap of asphalt paper, pulled up tightly around the remaining joint opening and stapled with fasteners. As soon as the select sand backfill has been clammed in, the lower portion of the joint section is filled by pouring a thick cement grout into the opening behind the protective paper. One of the most important things workmen have to learn is to install that paper accurately and tight, because all too often considerable grout will escape if this is not done.

Foreman J. Moran (L) and Clamshell Runner Quackenbush talk to their General Superintendent Oscar Corning (R).



Fill Top Half

Twenty-four hours after the lower portion of the joint has been poured, the remaining top half is filled with cement and mortar. After it is in place, it is coated with curing compound and the asphalt paper strip is replaced to act as a cure for this material.

The next operation is somewhat unusual. It comes along 24 hours after the joints have been filled. A special

Jeep-mounted device floods and vibrates the select sand, in order to develop excellent density and a good bearing underneath the spring line of the aqueduct pipe. Project officials conceived the idea after experimenting with flooded sand on lateral canals connected with the Coachella arm of the All-American irrigation system.

The chassis of this special device is a common Willys Jeep, with the clutch, brake, and steering wheel extended so the machine can be driven from the back. Two Dreyer concrete vibrators of the internal acting type were equipped with water nozzles leading out near their tips. The vibrators were then suspended from a framework which allows each unit to barely clear the sides of the concrete pipe. Raising and lowering is done by means of a hydraulic ram on each unit, rigged to a sheave on the frame. A small gas engine driven generator is provided to deliver electricity for running the vibrators. To protect the vibrators from excessive wear while sinking through the sand, hardfacing beads have been arc welded along the vibrator tips.

Barrel Nearby

Water is fed to the machine either by a 4000-gallon water tank truck or by outlets from 3000 feet of 3 and 4-in. Reynolds aluminum pipe. Water is pumped into this line from the first barrel of the aqueduct, close by, and about 60 psi of line pressure is maintained. A 30-hp electric-driven Gorman-Rupp pump does this pumping. As water enters the sand backfill through the vibrators, the 7000-cycle frequency of the electric machines consolidates the material in a hurry. The Jeep goes forward about 30 inches at a time, sticking the vibratory jets down at each stop. Speeds up to 100 feet an hour have already been made.

After this phase of compaction has been completed, the remaining backfill is pushed in almost level full with the ditch, using a Caterpillar D8 and dozer. This upper backfill is then thoroughly flooded by water from the aluminum pipeline, with the help of hose outlets every 40 feet. The remainder of material is then drifted back over the ditch location and the general right-of-way to make a neat, finished job.

Not until all this backfill is in are the inside joint interstices filled. These joints are carefully filled with cement mortar as a final step in the installation of the pipeline.

So well is the job organized and the work programmed that the 19-month completion schedule for pipe laying from December 15, 1952 will be beaten. By October 20 this year, less than 12 months from the December 15 starting date, officials hope to see all of the pipe laid on this schedule.

Oscar Corning, general superintendent, heads up the field forces for Peerless Concrete Pipe Corp. He is assisted by Emory Sanders, project superintendent. Engineering and inspection is under the general supervision of the Escondido office of the US Bureau of Reclamation, with Jean R. Walton in general charge.

With sand backfill placed, workmen finish up the joint-filling job on outside of the 75-in. aqueduct. Inside joints will not be grouted until all backfill is in place.

Unusual operation of project was the rapid water consolidation of sand backfill by Willys Jeep-mounted vibratory device. Two Dreyer vibrators were employed.

Workmen keep Pumpcrete hopper filled from Rex mixer powered by Waukesha engine. Concrete formed Ixtapantongo-Santa Barbara pipeline.

Mexico Builds Big Dam-Canal-Tunnel System

by Mary Saint Albans

Through Mexico's mountainous terrain Cia. Construcciones Jorge Larrea, S.A., is completing two dams, 21 miles of canals, 14 miles of tunnels, 37 miles of roads.

IN BLEAK isolated highlands near the juncture of the states of Michoacan and Mexico huddles El Chilar, construction camp of Construcciones Jorge Larrea, S. A., a company rated as Mexico's second in size and importance. El Chilar is dedicated to the last and toughest stretch of a 100 million peso job begun in 1948 and scheduled for completion in 1953. It is a vital part of the Federal Commission of Electricity's Miguel Aleman Hydroelectric system covering the Republic's most precipitous mountain section of the states of Michoacan and Mexico. Completion of the entire project will mean 360,000 kw of power delivered to Mexico City and surrounding country.

The Miguel Aleman hydroelectric system will utilize the same flow of water in six different plants. This is made possible by the extremely precipitous terrain with a total waterdrop of two kilometers or one and a fifth miles. The watershed takes in 3,500 square kilometers. Rivers involved are tributaries of the Cutzamala; the Malacatepec and Valley de Bravo rivers which form the Tilostoc. Temascaltepec and Ixtapan del Oro Rivers in the state of Mexico. Rivers Tuxpan and Zitacuaro are utilized in Michoacan where Jorge Larrea has the contract.

Power plants are either finished or in the building with the exception of San Bartolo No. 2 which has not yet commenced. Excavation has started on San Bartolo plant and the second plant will be located directly west near the Valle de Bravo basin. El Durazno plant, 18,000 kw, is in operation. Two big turbines in Ixtapantongo Plant have been in use for several years; the third is now being installed. Santa Barbara plant was finished two years ago. Tingambato plant, capacity 132,000 kw, will be completed in 1955 when the entire system should be put in operation. Tingambato will install four foreign turbines. This move was taken because of the cheaper rate of exchange in Europe and also because the United States requested that foreign equipment be used as war demanded so much material. A set of two circuits now carries power from Ixtapantongo to Mexico where it is taken over by the Mexico Light and Power Co. (Canadian). A second set of equal capacity is under construction to carry the additional load. When completed, the plant will deliver 360,000 kw normal, 414,000 maximum.

Larrea's contract was to build two dams; 14 miles of tunnels, 21 miles of masonry canals, and 37 miles of roads. These projects will provide a gravity water channel through mountains between Tuxpan, Michoacan, to El Chilar, state of Mexico. From there another company takes over to deliver the water to a considerable distance farther inland to Ixtapantongo, one of the big electrical plants of the system.

The dams and canals and tunnels on this section, now three-fourths completed, involve 2,660,000 cubic yards of excavation of which 1,300,000 cubic yards is rock. This rock varies from a foot square to six tons in size.

Early in 1948, Construcciones Jorge

On Miguel Aleman hydroelectric system, this 1½-yd. Bucyrus-Erie 38-B dragshovel digs canal section through mountains.

Rock abundance led to picturesque masonry construction for much of canal. Water will pass through six power plants.

Larrea, S. A. entered Michoacan to start work on El Bosque Dam. El Bosque means the woods. This dam is 12 miles from Zitacuaro, a town bisected by the Pan American highway which runs south to Mexico, north and west to Morelia and Guadalajara and on to Alaska—if you keep going.

At this time many workmen and foremen and all engineers lived in Zitacuaro and every morning scores of trucks and cars wended through beautiful Zitacuaro Valley to Camp La Encarnacion, located about three miles from the dam. Included in this procession, too, were the cars and pickups of the Comision Federal de Electricidad (C.F.E., a Department of the Mexican Government) with engineers and helpers. Original plans and specifications are made in Mexico City by the Government head engineers; but resident engineers remain on each job to supervise all work and frequently, too, as conditions change, to change specifications. Government men and contractors work closely together and engineers from both organizations confer daily either at Camp La Encarnacion or at construction sites.

Once a palatial estate, the courtyard buildings of the old hacienda had been remodeled into offices, shops and warehouses. Today this is still the main headquarters of four work camps. Administrator Felipe Andreau keeps his headquarters there as do the engineers.

When the writer visited El Bosque in the summer of 1948, the spillway was well along. Already a Jaeger 11S mixer with Red Seal engine was pouring the first lot of the 2,666 cubic yards of concrete to be used on this fan-shaped section of the dam.

Nearby two shovels dug red earth for the embankment which ran about two blocks from spillway to dam.

The latter was to rise 210 feet from a deep narrow barranca formerly the bed of the Zitacuaro River which had been diverted through 1,050 feet tunnel. Passing two Le Roi compressors I eased my way foot by foot down a narrow zigzag trail to the well-shaded bottom. Here a dozen or so rock drills were working, powered from a Schramm compressor and from the Le Roi compressors above.

Instead of returning, I followed another trail along the barranca to flag a dump truck rolling down to the river where men were hefting gravel into trucks via hand shovels.

In places, tractors and dozers excavated canal. Here a Caterpillar D8 shoves dirt out of waterway bed. The hydroelectric system's total water drop is 1⅛ miles.

Reservoir Rises

The dam is made of earth or impervious material with rock on both sides. Length is 1,800 feet; capacity of basin is 290 million cubic yards. Over 1,000 acres are now covered with water. The spillway is 330 feet long with 1,320 cubic yards capacity.

The following summer on a second trip, I found the spillway completed, the embankment almost so, and the red earth well up in the barranca. Beyond and above, five Le Roi compressors were shooting power to rock tools to cut into the uneven terrain for rock to finish the embankment. A Northwest shovel worked over five Euclids in the distance.

Two Caterpillars D8's with LeTourneau dozers were pushing earth over the barranca's edge on one corner directly over the dam. On the very edge of the precipice a Gardner-Denver grout pump was feeding concrete to a ledge halfway to the bottom.

About two miles by car from the dam, was the tunnel No. 1 portal where a small Plymouth locomotive brought out debris in a string of two cubic yard cars to dump over a bank. A Chicago Pneumatic Jumbo with eight rock tools loosened the material and after dynamiting, a Gardner-Denver mucker loaded the cars.

At the entrance a Chicago Pneumatic Y type stationary compressor furnished power. As in most Mexican tunnels under construction, a small shrine with a candle burning below the Virgin of Guadalupe enclosed in glass hung about a hundred feet from the entrance.

Fifteen kilometers by pickup on a mountainous road brings one to the Tunnel's exit. This was the rainy season and night rains usually meant a clear and beautiful, if muddy morning, with the mud dry by noon.

After many curves we suddenly saw

At El Bosque dam, Northwest shovel loads rocky fill to Euclids. Embankment shows at far right. The dam is under contract to Construcciones Jorge Larrea, S. A.

across the lovely El Llano Valley, the tunnel's exit well up on the opposite mountain. We passed an Austin-Western 99 H grading a section of the road and groups of men working on small culverts. Here and there, workmen were mortaring the channel.

Already much drilling and blasting had been done, two shovels had dug out the rocky material and big rocks embedded in cement were beginning to mark the sides and bottoms. Canals are three and a half meters deep with 45% slopes. As measurements must be exact and cleancut, the rock and earth remaining after the shovel gets out, are removed with hand shovels.

Cement and gravel and sand is brought to the location by truck and mixed by hand. There are two hundred masons and 400 peon helpers, engaged in this work, one mason to two peons. Had there not been such a plethora of rock, canals from El Bosque to El Chilar would have been fashioned of cement.

Ingeniero Celis Cano, at that time Larrea's technical superintendent, in charge of this and other projects, had driven me from Zitacuaro to El Chilar on this last trip in the early summer of 1952. He is a graduate of the engineering department of Mexico's National University. He built the big Endo Dam near historic Tula in the Otomi country, held executive posts on the Valsequillo Dam in Puebla and the Excame Dam in Zacatecas.

We viewed the exit of Tunnel 1 now completed, by far the longest tunnel of the twelve in this section of the hydro-electrical project, then 125 feet from Auxiliary Tunnel 1. Not included in original specifications, this 1,600 feet of underground waterway was made necessary by the loose rock on overhanging precipices.

Three hundred and seventy eight feet long Siphon Dos Rios canal came next. Here a Rex 11S mixer was working. Near by a Cedar Rapids crusher turned out aggregate. Gravel, found in five quarries, all reasonably near operations, is loaded into trucks by hand labor. Another siphon, Landeros, followed.

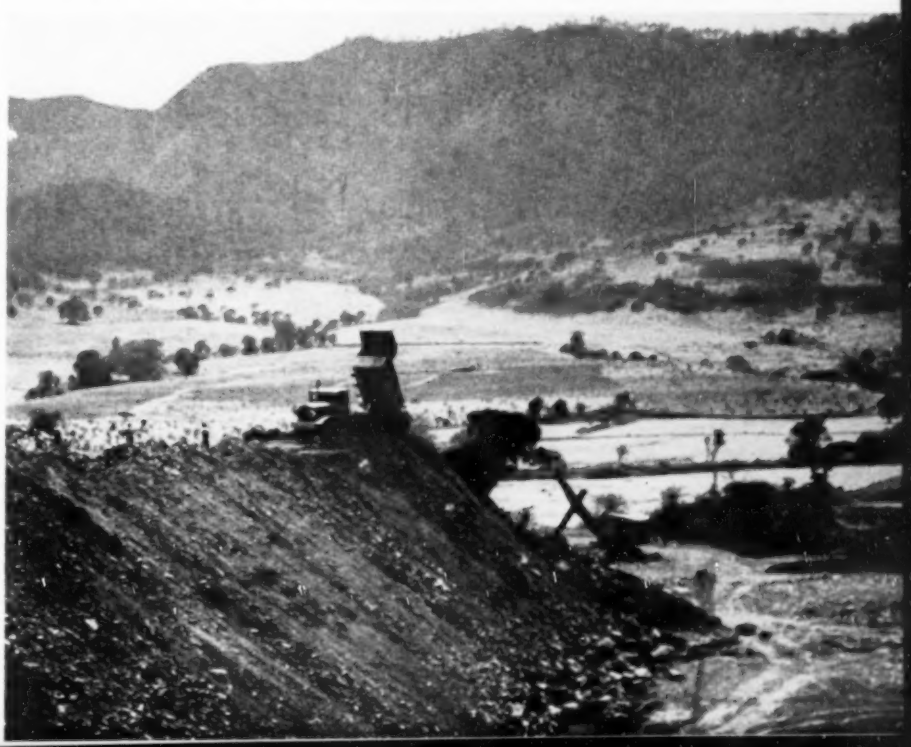
Cast 50 Bridges

The entire channel is crossed by fifty concrete bridges, several in process of construction. They are made over wooden forms which stand for a week to allow the concrete to dry, then are removed and used on another location. These small crossings not only serve the people who live in the back mountains, but act as water runoffs during rains.

The road, which parallels the channels except for the runarounds, sometimes very steep and involved, where tunnels occur, is made mostly from material dug out of the canals. Four dragshovels were at work on canals. They poured the rock and earth onto the road where two Cat D8's and two Bucyrus-Erie Bullgraders on International TD-18's smoothed it into shape. Later a motorgrader would assist the many passing trucks in compaction.

Just before we reached Camp Yer-

Tuxpan dam takes shape. Euclid dump adds to earth-fill embankment while Koehring shovel works at fill base. Completed, this barrier will be 1,740 feet long.



babuena, I noted six Chicago Pneumatic compressors with Cat D13000 engines ranged along the side of the road to take care of the drills which dug into the parallelling canal site. A pound of dynamite is used for every cubic yard of rock. There are 2,115 feet of open channel from Siphon Landeros to Tunnel No. 2, which is 1,500 feet long. Auxiliary Tunnel No. 2 was also, as Auxiliary Tunnel 1, decided upon long after specifications had been made, and for the same reason: Rock slides in the area.

From Auxiliary Tunnel 2 to Tunnel 3 comes 1,424 feet of open channels. In this section is Siphon Los Hoyos, 378 feet long and Siphon Yerbabuena, 459 feet long.

Slides and Seepage

Some distance beyond a TD-24 Bucyrus-Erie angle dozer was digging into a mountain. It is tedious work cutting roads and channels into precipices and sometimes when on narrow ledges, extremely dangerous. We began to make the long dizzy loops to reach Tunnel No. 3 which was intersected, said Ing. Celis Cano, by two cross tunnels each 3,087 feet long.

Tunnel construction fought two problems: First, the great amount of water seepage. Ordinary water seepage approximates 50 cubic feet a second. Here usually it was much higher with Tunnel No. 3 rising to 150 cubic feet. This demanded a great number of pumps and the consequent complications.

The second problem was the bad condition of the earth and rock, making slides a menace in the tunnel. It was necessary to line the tunnel with closely set wooden beams. In Auxiliary Tunnel No. 4, wood covered the rock completely.

On Tunnel 3 a Knickerbocker mixer poured concrete into cars of the small Plymouth train which carried it to the elevator which emptied into a Rex pumpcrete. The latter shot it through 6-in. tubes into the forms.

From the exit of this tunnel to Tunnel No. 4 a covered channel continued for 900 feet. No. 4 is intersected by two cross tunnels; one, 1,600 feet long; one, 7,500 feet long. Here the same machinery was employed as in No. 3: A 16S Knickerbocker mixing and a new Rex pumpcrete.

From Tunnel 4 to Auxiliary Tunnel 4 comes 2,400 feet of covered canal. Here, too, rock slides are a constant danger. Auxiliary No. 4 penetrates the Cerro de Ixtapa.

Ing. Rubio Palacio, young, competent, exceedingly hard working, and evidently fascinated with his job, is resident engineer at El Chilar. His domain extends south of Yerbabuena to the end of Auxiliary Tunnel 4, where another company takes over.

In his section ten shovels were working: Five Northwests, one General, four Limas and a new Bucyrus-Erie Hydrohoe and a new Bucyrus-Erie dragshovel.

Eleven tractors were keeping pace with the shovels. Ing. Celis Cano figured on one tractor for one shovel. Tractors included five Caterpillars—four D8's and one D7—and six Internationals with Bucyrus-Erie Bullgraders. The Internationals were three TD-18's and three TD-24's.

Five Chicago Pneumatic Type Y

Left: International TD-24 crawler with Bucyrus-Erie Bullgrader makes grade on some of 37 miles of road in Construcciones Jorge Larrea, S.A., contract. Right: Engineer Jorge Larrea is head of firm which bears his name.

stationary compressors supply air pressure. These are enclosed and stationed at strategic spots accessible to the tunnels. Fifteen portable compressors work on rock, on channel, and on road sites. There are 12 CP's with D-13000 motors; two Gardner-Denvers with the same engines and a Schramm. The rock drills are 42s and 59s. The 19 Chicago Pneumatic Jumbos have numbers 50 and 60 drills attached.

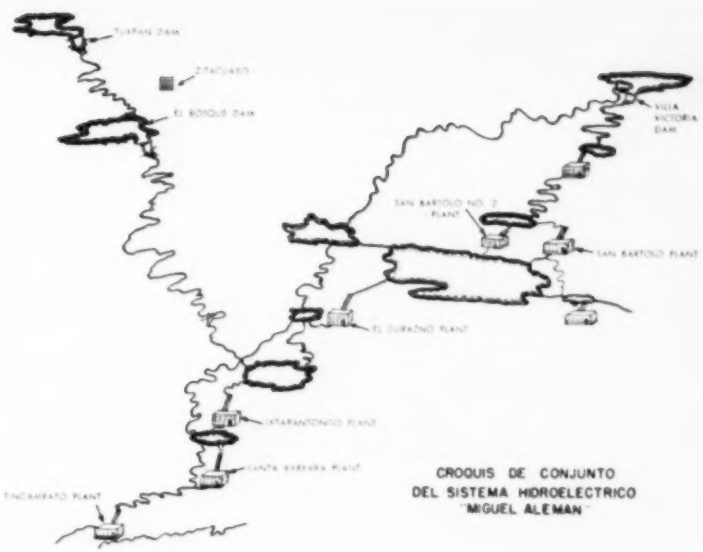
Tuxpan Dam

Thirteen pneumatic vibrators were used in the tunnel, ten electric ventilators to purify the air and because of the excess seepages, thirty pumps. These included Deming, Worthington, German Rupp and Rex. Two new Rex pumpcretes were moved from tunnel to tunnel as demanded.

Nine Plymouth trains with 150 wagons not only hauled out all debris but also hauled concrete to line the tunnels.

The work will be completed this year with testing of canals and tunnels made in November and January.

Not until early in 1952 did work start on the Tuxpan dam, tunnels, channels, and road. The dam is 66 feet high, 1,740 feet long at the crown with a reservoir capacity of 20 million cubic meters. The core is four meters high, one meter thick; after this comes 65,789 cubic yards of impervious material followed by two feet of transition material and then 26,600 yards of rock.



Miguel Aleman hydroelectric system plan spots location of six power plants. Dams, tunnels, canals, and roads located along the left fork are covered in this article.

When the writer viewed the work in the early summer, Rex pumps were shooting streams of water on the dam rock surface. Euclids fed by Northwest shovels supplied rock and Cat dozers pushed it level.

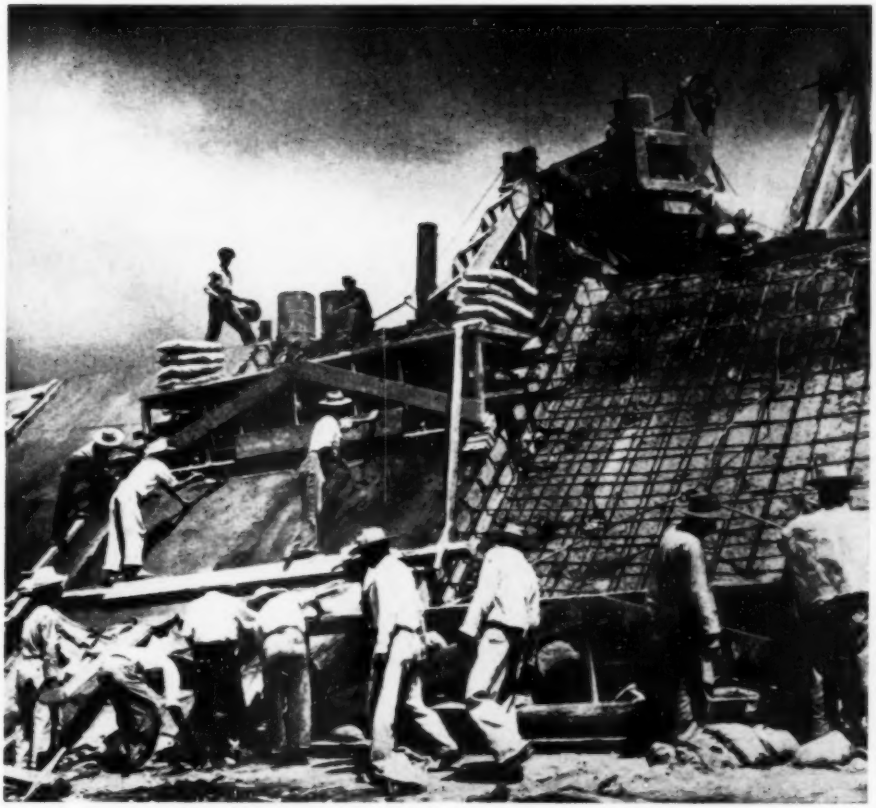
At the high intake, entrance of Tunnel No. 1, two Rex 16S mixers poured concrete. Inside the tunnel a Chicago Pneumatic Jumbo worked with a Gardner-Denver mucker removing blasted material. Along the bed of the canal an Eimco mucker threw rock into Euclids which carried it to the dam site.

Most of the channel from Tuxpan to El Bosque will be earth concrete instead of masonry. After extensive testing the C.F.E. (Government Electricity Commission) found that this type of concrete was even cheaper than the masonry, and it was neater in appearance. Along with three Rex mixers, two Knickerbockers will furnish concrete for the lining.

The six tunnels from Tuxpan to El Bosque have a total length of 19,260 feet. Combined length of canals and siphons is 46,923 feet. The job will be finished in 1954.

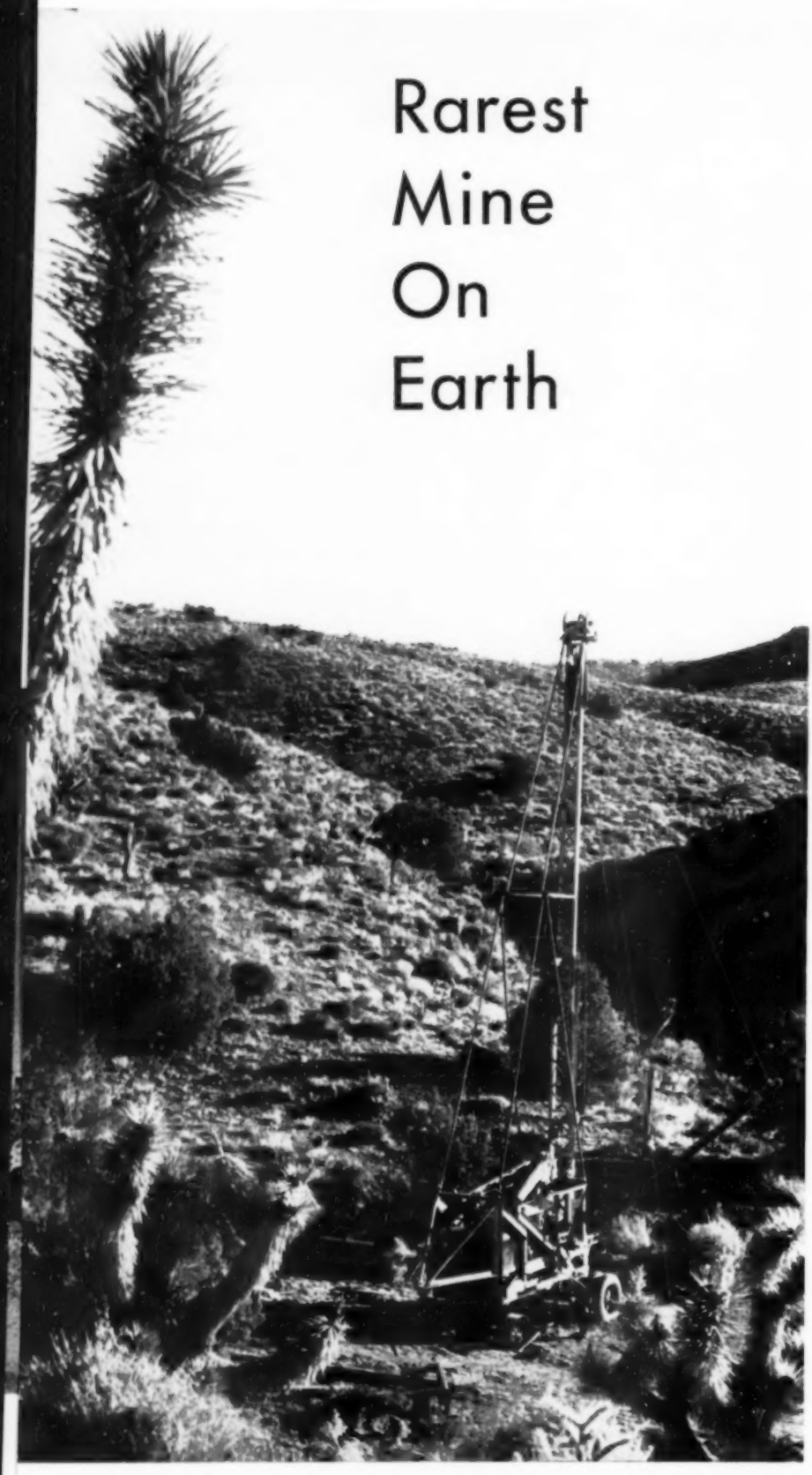
Ingeniero Eduardo Patiño, resident engineer, lives about a third of a mile from the damsite on the Mexico-Nogales highway.

Jorge Larrea, president, and Javier Larrea, general manager, regularly visit the various jobs.



Crew lays El Bosque spillway on reinforcing mesh. Jaeger mixer powered by Red Seal engine makes concrete for dam which spans Zitacuaro river.

Rarest Mine On Earth



Water and prospect holes go down with Bucyrus-Erie 22-W drill. Charles Cribbs, Las Vegas driller, sets rig up at Molybdenum Corp. of America's mile-high mine.

Rare earth metals found in California may revolutionize steelmaking. Drill, excavating equipment begin mining for Molybdenum Corp. of America.

by Ray Day

THE date was April 23, 1949. In a battered old jalopy of uncertain parentage, two prospectors —Herbert S. Woodward and Clarence Watkins of Goodsprings, Nev.— churned and ground their way up a shallow sand wash surrounded by high mountains back of the abandoned old Sulphide Queen gold mine, just off US Highway 91 near Mountain Pass, Calif. Ticking away on the back seat was a new $150 Geiger counter, which old "Pop" Simons had donated to the prospecting venture. At the driver's position sat Woodward, reflecting that this was a hell of a way for a man to spend his birthday.

The old Chevrolet wheezed to a stop near the head of the wash. Woodward got out the Geiger counter, and Watkins reached for a miner's pick.

"I see a little color showing up on that ledge," he said. "This is as good a place as any to pick up an atomic bomb."

Woodward set up the counter and adjusted the phones. The steady tick of Nature's ever-present background count came to his ears. Watkins picked off a chunk of rock, stuck it close to the Geiger counter, and was just saying, "here, try this" when Woodward's face changed into a wild man's. The Geiger counter had gone crazy!

What that Geiger counter had discovered was not uranium or cobalt. It took months to find that out. What the Geiger counter did show was a discovery practically unbelievable in this the 20th Century. What the Geiger showed was destined to revolutionize various forms of metallurgy. It would soon bring the Atomic Energy Commission into the picture. It was destined to bring Woodward and Watkins satisfaction, pleasure, and gain the rest of their lives. Eventually the big find was destined to skyrocket Molybdenum Corporation of America stock from $7 to a dizzy $80 a share in little more than a year's time. Old Pop Simons, who runs a service station and motor court at Jean, Nev., would get $90,000 back on his $150 investment. Fabulous, but true.

When Woodward and Watkins finally found out what they had, even they

Herbert Woodward, left, co-discoverer of Mountain Pass rare earth deposit, holds concentrate which Chief Metallurgist A. M. Wilson studies with spectroscope.

could hardly believe it. For they had discovered a veritable mountain of the rare earth minerals — minerals with names like Lanthanum and Ytterbium and Europium so obscure that most people had never heard of them. Ironically, it was the presence of thorium not associated with the rare earths which kicked the Geiger counter out of sight. They would probably never have found the rare earth deposit if they hadn't haunted the Bureau of Mines and various independent laboratories for months to find what made the Geiger go crazy.

The rare earth group of metals belong to the elements of Earth, and so far as is now known, include a list of 14. Listed below are these 14 metals, with the atomic number of each, which analyses have shown to be in the Mountain Pass deposit:

Lanthanum	57
Cerium	58
Praeseodymium	59
Neodymium	60
Samarium	62
Europium	63
Gadolinum	64
Teribium	65
Dysprosium	66
Holmium	67
Erbium	68
Thulium	69
Ytterbium	70
Lutetium	71

The rare earth metals are as obscure as their uses are interesting. Individually or in combination, the rare earth group makes carbon-arc electrodes for motion picture projectors, searchlights, floodlights, tracer bullets, optical lenses, polishes, waterproof fabrics, lighter flints, and ceramics.

Metallurgical Use

One of the most spectacular uses, which now appears almost a certainty, is in metallurgy. In a cubic foot of steel, for example, there are millions of minute crystals which constitute that many flaws. Steelmakers can upgrade the quality of steel by many degrees by adding cerium, lanthanum, or a concentrate of the 14 metals, because these rare earth metals *prevent crystallization*. Imagine axles and wheels that

It's long way from Fairbanks-Morse pump on dry wash to Mountain Pass Mine at which Author Ray Day is looking.

Powdermen and Ingersoll-Rand wagon drill move in to open quarry. Above: A jackhammer with a portable Ingersoll-Rand compressor breaks up oversize rock.

won't crack; rods and drill stems that won't twist. They're on the way, as a result of the Mountain Pass discovery.

The effect of rare earth metals in stainless-steel making, magnesium alloy and other such metallurgy is certain to affect those processes in the future, say such outfits as The Carpenter Steel Co. and representatives of Dow Chemical Co.

If you've got a nose for news, you soon find out enough about the stuff to get that nose bloodied with stony rebuffs. You find that cerium, for example, is 16 times more effective in shielding uranium radiation than ordinary lead. You find that the Munitions Board is interested in stockpiling the stuff. How big a stockpile is anybody's guess. You hear about certain experiments and you know about the use of cerium-magnesium alloys in jet engines. But the details of these generalizations are top secret.

MCA Purchases Deposit

From the very beginning of Woodward and Watkins' discovery, Molybdenum Corporation of America was interested in acquiring the property. Moly President Marx Hirsch is also a Director of Ronson Art Metal Works, makers of Ronson lighters. For some time the normal Brazilian and Indian sources of cerium had been either cut off or threatened by embargo. After initial negotiations, an option was taken on all the land covered by the rare-earth deposit, along with certain other lands just outside the deposit limits. After considerable studies and borings had been made, MCA exercised its various options and now owns the property.

Test holes drilled over the property were put down with an Ingersoll-Rand wagon drill specially equipped with a Roto-Clone dust collection unit for sampling the material. Test holes were sunk 50 feet deep on a pattern averaging 25 feet square. In most of the tests, the ore at the bottom was as rich as at the top, and present indications make a 150-ft. deposit of rich ore seem likely.

The mine contains by far the largest deposit of rare earth metals in the world. There are small sources of supply in this country, mostly in Idaho, Montana, and Florida. However, most of the supply of rare earth metals must be imported. Cerium, for example, the principal metal in the group, is extracted from monezite sands in India and Brazil, and the recovery from these sands averages less than 1%. The Mountain Pass deposit will average between 9-10% rare earth.

When Molybdenum Corporation moved into the property to start its

Quarry begins to take shape. A Bucyrus-Erie ¾-yd. 20-B loads rare earth ore to Dodge dump truck, which carries it over mountain to processing plant where barite and rare earth elements can be separated. Plant is about ¾-mile from quarry.

development, it was starting from scratch in spite of considerable mining experience of other types (molybdenum, vanadium) in Utah, New Mexico, and Colorado. No precedents had ever been set, for example, in recovering the rare earth metals from the raw material. About all that Moly had to go on from the start were a few buildings near the old Sulphide Queen shaft where gold mining had been abandoned, and a deposit of rare earth conservatively estimated to last for the next century.

Study Deposit

Geologically, the deposit has been studied, surveyed, and restudied. The US Geological Survey, with D. F. Hewett in charge, made field studies as far back as 1924. Hewett, along with E. T. Schenk of the US Bureau of Mines at Boulder City, gets high praise from Woodward and Watkins for his part in analyzing samples brought in shortly after the discovery was made. Later USGS studies after the orebody was identified showed that the rare-earth ore occurs as a vein roughly 250 feet thick and over 2000 feet long. At the "Birthday" site where Woodward and Watkins made their discovery, for example, the rare earth veins occur as fills in fractures of shonkonite, a rather uncommon igneous rock, pre-dating other igneous formations such as syenite, granite, and lamprophyre, common to the area.

In other parts of the area, the material occurs with barite (a barium sulfite), calcite, and some silica and silicates. A large portion of the area contains about 15% bastnaesite, formerly found only at one place in the world, near Bastnaes, Sweden, up to that time the only known source for rare earth metals in anything like commercial quantities.

MCA has lost little time in developing the property to workable mining conditions, and already the Mountain Pass plant is working about 125 tons a day. Later, as the demand for the product grows with the realization that the United States now has this material, the operation will in all likelihood be expanded.

In Remote Area

Mountain Pass is in a remote area, although it lies within about 1¼ miles of US 91, the transcontinental highway linking Barstow, Calif., and Las Vegas, Nev. The nearest town was Nipton, Calif., a tiny village 25 miles distant. The mine area had little or no water, and since it lies at an elevation of about 5000 feet in high mountainous country just inside eastern California, there was little probability of finding water without considerable drilling.

Charles Cribbs, a driller from Las Vegas, Nev., came out for MCA and stayed with the job of drilling water well holes and prospecting bores. Cribbs owns a 2-year-old Bucyrus-Erie 22-W churn drill, which he pulls around with a Ford truck. Working closely with H. D. Bailey, Moly's general manager at Mountain Pass, Cribbs drilled eight wells in crevices and through the dry beds of washes throughout the area. The biggest flow he found in any of the 250-ft. wells was 10 gpm, but this water, collected in pipes and tanks and pumped up to a main 5000-gallon reservoir at the mine, is beginning to serve the property nicely. Officials now contemplate dropping down to the bed of Dry Lake, where the Union Pacific Railroad has always brought in good wells, to do some more drilling. Wells sunk at Dry Lake will require large pumps to raise the water up the mountainside.

Quarry Opens

Major mining now under way is on the low side of the mountain southwest of the old Sulphide Queen gold mine. For the time being, this deposit is more suitable for working than the veins discovered by Woodward and Watkins at the Birthday claim, farther north.

A sizable quarry is taking shape, and in line with what usually has happened every time private enterprise moved in to develop the West, the job has started with drilling and excavation.

The orebody is solid and rocky, but it is not hard to drill in the sense that blue granite and malapai is hard. Ordinary rock bits last 300 and 350 feet before they dull. A stationary 450-cfm Ingersoll-Rand Imperial compressor, stationed at the mine, furnishes a constant source of compressed air both to the mine and to the quarry. To round this out, auxiliary portable compressors are used for their mobility. These include a 315-cfm Worthington, and a 105 cfm Ingersoll-Rand.

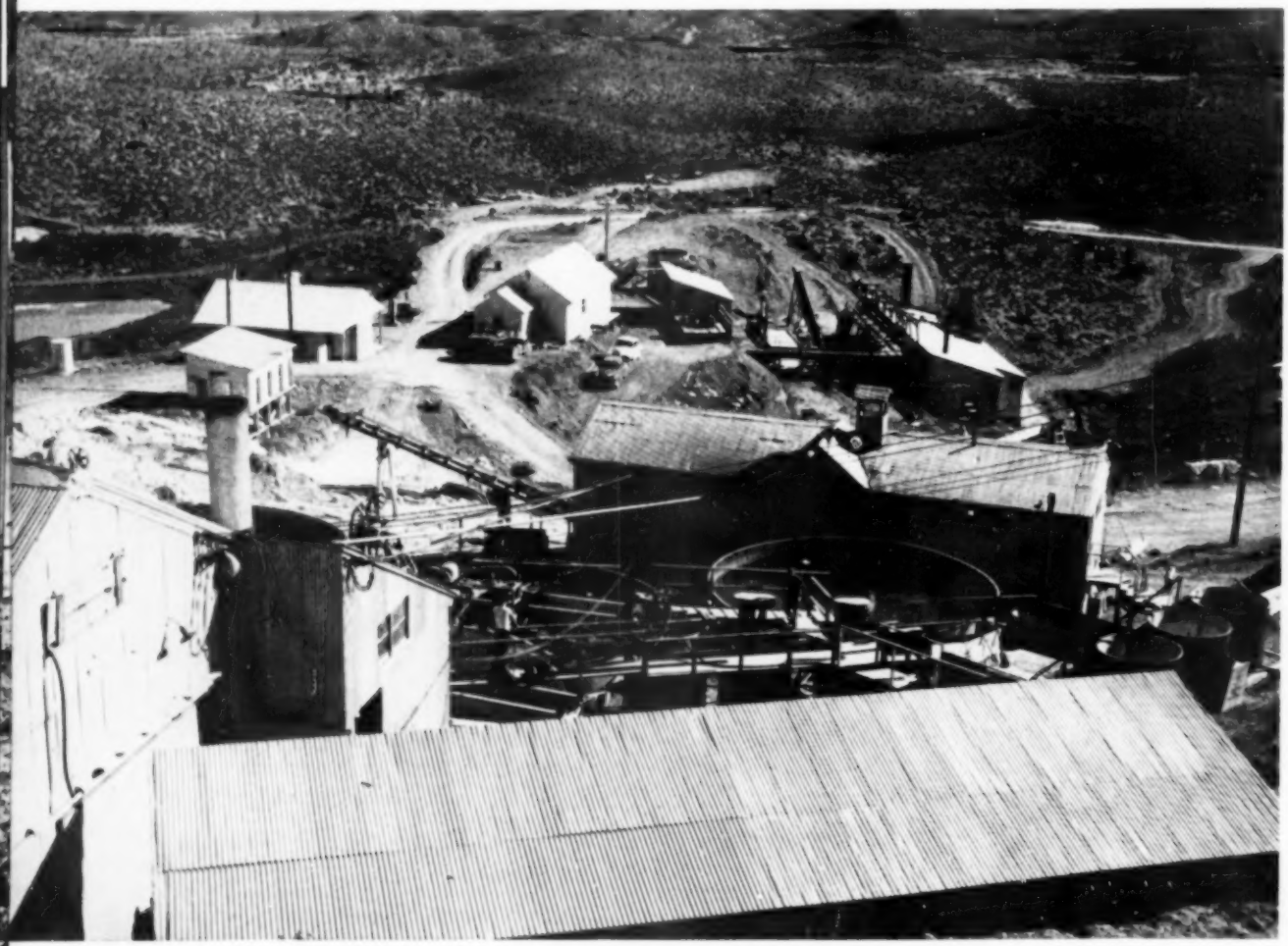
Two Ingersoll-Rand wagon drills, with several Ingersoll-Rand 55-lb. Jackhamers are doing all the drilling. Timken drill steel is being used—so far 24-ft. steel has been the longest—and the holes are bottomed at 2½ inches by Timken rock bits. Hardest drilling formation of all is the barite, which will slow a machine down whenever the formation occurs as a sizable chunk. John Martin, quarry superintendent, is currently sinking his drill holes on 4½-ft. centers, and carrying them down to 12 inches below what he hopes will be the first quarry floor line soon. That pattern seems to work best with the peculiar type of loading this material requires to break down.

Discard Bits

Drill bits are used three to four times by taking them in to Los Angeles to Emsco Concrete Cutting Corp., a specialty outfit well known for its bit sharpening department. When bits wear down to the point where they will no longer bottom at reasonable diameter, they are discarded.

Hercomite bag powder is being used to break up the orebody. Considerable blasting difficulty has been the rule, due to the presence of numerous large pockets, probably formed when ancient water flows leached out the calcium from the deposit. When these "water bugs" are found, Martin tries to load and stem a hole to block off as much as possible the usual bootleg which results if powder blows out through these voids. Shots usually consist of about 50 holes, so the shooting machine will not be overloaded. To help fragmentation along, Martin's powdermen are barrel loading the holes without springing. The first row is equipped with instantaneous blasting caps. No. 1 and 2 delays are alternated in the next row; No. 3's go in the next 2 rows; No. 4's are placed next to the future quarry face. The holes are shot by hooking them in parallel, and the resulting ore pile is now a pretty sight. There are very few pieces of oversize material which won't go through the 15 x 24 primary crusher.

What oversize pieces there are, however, are reworked by a small Jackhamer, and are broken by light explosive charges. The percentage of sec-



Looking down over the spread from the top of the shaft of the old Sulphide Queen gold mine, we see the rare earth recovery tanks, office, and shop at left, the new oxide plant at right center, and a small trailer camp in the distant background.

ondary shooting will not exceed five, however.

Broken ore is being loaded by a ¾-yd. Bucyrus-Erie shovel, equipped with an Esco dipper and teeth. Hauling equipment under this shovel consists of 2 units: a KB-6 International 3-yd. truck and a Dodge 4-yd. machine. These trucks haul the material up to the mine processing location, about ¾-mile distant, where the barite and rare earth elements can be separated.

At present, the rate of loading is not great enough to keep the Bucyrus-Erie shovel busy, but the machine is helping out also in stacking low grade material, shaping the quarry face, and doing a minor amount of stripping. The quarry floor is bladed at intervals by an International TD-9 with an Ateco dozer blade.

Complex Recovery Process

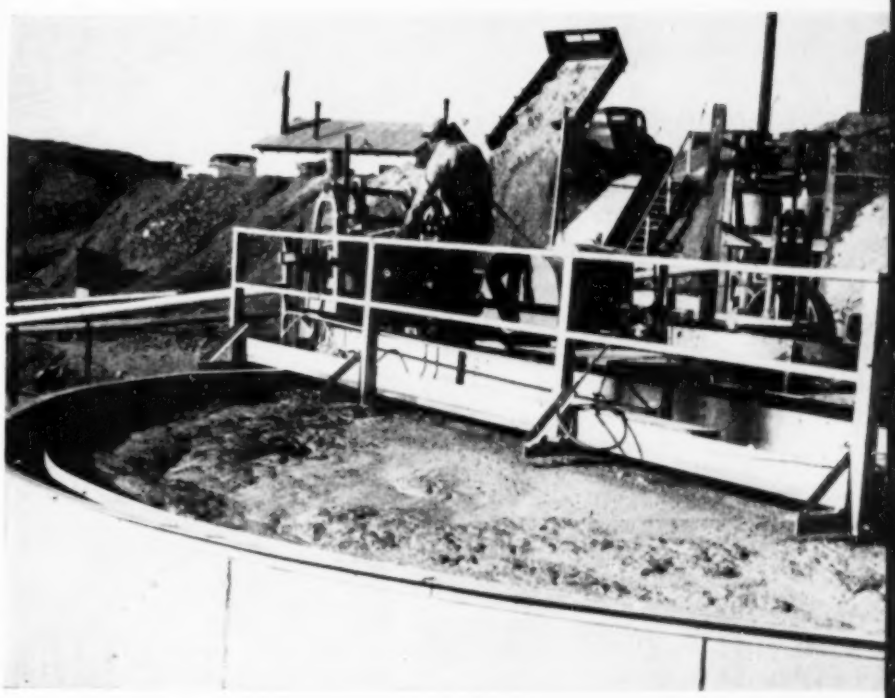
The recovery of rare earth metals from the raw quarry ore is, so far as is known, the only operation of its kind in the world. Although certain broad flotation principles are being used which are common to copper and other such mining, the detailed process had to be worked out from scratch. The first recovery method tried wasted too much rare earth in the tailings, so Chief Metallurgist A. M. Wilson and other key people spent almost two months in residence at Golden, Colo., where they worked out a successful pilot process with the help of the Colorado School of Mines Research Foundation.

Details of the recovery process are still a company secret, but this much can be told:

Raw ore is crushed to minus ½-in. in two stages, passing through a 15 x 24 Gruendler jaw and a 2-ft. Symons cone crusher. These crushers are powered by electric motors, with electricity generated on the site by three 100-kw Murphy Diesel electric sets. The ½-in. minus ore is then passed through a 54 x 96 ball mill, which operates in closed circuit with a 42-in. Dorr classifier.

The pulp is then floated to produce two rare earth concentrates. In its route through the separation process, the pulp passes through conditioners, 24-in. Agitair flotation machines, is cleaned by No. 18 Denver flotation machines, and the concentrate is thickened and filtered on Eimco disc filters. A process has been worked out where the rare earth concentrates are floated off the top of the tanks, while

Huber maintainer with front-end loader fills Dodge dump with low-grade concentrate. International TD-9 crawler and dozer stockpiles ore at mountainside plant.



Rare earth metals float on surface of this tank. Chemists worked complex process out from scratch; nobody had done it before. Truck dumps precipitate.

the reject barite is precipitated on the bottom.

High and low grade rare earth concentrates are shipped by truck to a railhead, and transferred for shipment by rail. At the present time Lindsay Light & Chemical Co., a Chicago concern, is Moly's biggest industrial customer. A new rare earth oxide chemical plant is now under construction at Mountain Pass Mine, and some of the material will soon be leaving the place in that form. Much of the powdered barite can be sold for drilling mud in oilfield work.

At the present time MCA has a 60-man crew at work at the mine. Many key people came from stibnite mining in Idaho, including General Manager Bailey, his assistant, Russell Wood, Quarry Superintendent John Martin, and Mill Superintendent Chris Lee.

During the early stages many of the crew members lived at the site in a small trailer village. A modern masonry dormitory has now been built. Mountain Pass has about four winter months when temperatures go below freezing at night, and about five summer months when they go to 120° at times. In general, however, the climate is excellent.

As U. S. industry and research adopts the Mountain Pass metal more generally, the mine will likely grow, and the camp will be enlarged. MCA is moving now on a steady, sound, well planned development program of the property.

Introduces New Mining Era

Current operations introduce a new mining era to a region whose mining history would fill a volume. The towering mountains and remote valleys of Mountain Pass were first explored in force about 1861, when gold miners from the Sutter's Mill area in California worked their way southeastward through California and Nevada. In 1854 lead was found nearby in Nevada. In 1870, a number of silver bearing veins were located in the Ivanpah area, just 10 miles north of Mountain Pass. About $5 million worth of silver was taken out in 10 years, a town of 500 people sprung up, dwindled to 50 in 1895, and now is a ghost place with nothing left save a few old adobe walls. Copper was found five miles west of Mountain Pass, with gold and copper four miles southeast.

Mining interest died in the 1890's, but revived a short time when the Southern Pacific built a spur line from Goffs to Barnwell, about 20 miles southeast, to explore the Vanderbilt gold veins in that locality.

There was a real mining boom during World War I, when high prices for copper, lead, and zinc stimulated much interest. Many a ghost mine which paid off then has been idle ever since. The high lead prices of 1924 caused Fred Piehl of Goodsprings to open the Sulphide Queen hill, sink several pits and shallow shafts to locate four claims. Little ore was taken out until 1933, when Piehl found gold in the formation. In 1939-41 J. C. Howard worked Piehl's Sulphide Queen Hill by sinking a 365-ft. shaft and opening numerous levels. About $12,000 worth of gold was taken out.

Talks About Uranium

The latest and most modern mining era started in late March, 1949, when Marty Hess, an engineer, gave a talk in Goodsprings on the search for uranium. Herbert Woodward attended that meeting. Hess emphasized the usual association of uranium and cobalt, an element known to occur widely in the Goodsprings area. His talk did not produce an A-bomb, but it did start off the chain reaction which eventually started the new era.

Fred Piehl died of a heart attack while walking over the Sulphide Queen Hill after the rare earth elements had been identified. A San Francisco prospector, Otto Krohn, contributed much to the early exploration of the area. Woodward, who is an engineer-metallurgist in his own right, has been retained by Moly at Mountain Pass to help Chief Metallurgist Wilson iron the kinks out of the complex new recovery process. Watkins, interested in prospecting, still prospects. "Pop" Simons is still in business in Jean, Nev. C. Bryant Kasey, who also shared in the early exploration and development, has benefited, too, from this important discovery to the nation.

Whatever the future holds for Mountain Pass, mining historians will probably never record anything more exciting, more colorful, more incredible, or more helpful to the ultimate growth of America's industrial might than the wild ticking of that Geiger counter on Herb Woodward's birthday.

He wasn't surprised. D. F. Hewett of U. S. Geological Survey stuck with ore samples. Herb Woodward credits much to Hewett, shown before map he made in 1924.

"Euc" lever-type Scrapers

Pay off in Performance

Getting a heaped load of 21 cu. yds. at Jemez Dam in New Mexico.

- 15.5 cu. yds. struck
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- 10-speed transmission
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- Lever actuated bowl, apron & ejector—only 13 ft. of cable

Lever action, an exclusive Euclid Scraper development, offers many profit-making advantages that you can't get in any other scraper. It is the most important advancement in scraper design and performance in many years!

Just think of it—no cables to break because bowl and apron lift and the positive roll-out ejector are actuated by interchangeable hydraulic jacks. Only 13 feet of long-life cable, part of the apron lift, are used. There's no danger of a broken cable causing damage or delay—ever, and especially on high speed hauls. There's no costly cable replacement and lost time threading cable through dozens of sheaves and pulleys. And most important of all is the top performance and high job availability—the low cost production—you can count on with "Eucs" on your job.

Get the complete story from your Euclid distributor and check all of the features that mean more loads and bigger payloads per hour at lower cost. Just ask for your copy of Form B502.

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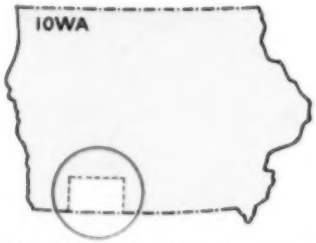
Taking Iowa



RINGGOLD COUNTY has 935 miles of county roads. This is the location of farm to market road construction done by the International Crawler fleet of Easter & Schroeder, Inc.

Pick Your Site and Set Your Hour...
We'll Demonstrate Our Tractor's Power

"IDEAL FOR FARM-TO-MARKET ROAD CONSTRUCTION," say Joe Easter and Don Schroeder (above). "In our eight month's working season, our five TD-18A units, with the sixth as a pusher, moved approximately 540,000 cubic yards, with minimum downtime."

ROAD BUILDING PRODUCTION LINE! Part of the Easter & Schroeder fleet of International crawlers on a regrading job in Ringgold County, Iowa. On this seven-mile stretch they moved 78,000 cubic yards in three weeks' time. "*We move it that way all the time,*" say the owners.

to Town

Farm-to-market roads get big boost fast from the International Crawler fleet of Easter & Schroeder, Inc.

The dirt flies when Easter & Schroeder, Inc., move in with their fast, powerful fleet of International crawlers . . . and Iowans can get to town and back in time to do the milking. For these Griswold, Iowa, contractors specialize in farm-to-market roads in the tall corn state.

Take the seven-mile job in Ringgold County, Iowa, you see here. In three weeks' time, Easter and Schroeder moved 78,000 cubic yards of dirt to give the road a 24-foot top on a 66-foot right of way.

Easter and Schroeder came to this Ringgold County job from one in Taylor County, where they moved 35,000 cubic yards of dirt on a two-mile stretch, completing the job in six 11-hour days.

"After 25-years' experience working in dirt, we settled on a crawler fleet one hundred per cent International," say these contractor partners. The fleet now consists of six International TD-18As with scrapers and 'dozers and a TD-14A with tamping roller.

Do you want speed and dependable economy under tough conditions? Then get in touch with your International Industrial Distributor, for all the facts on Power that Pays!

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SEVEN GREAT INTERNATIONAL CRAWLERS...EACH WITH MATCHED EQUIPMENT FOR EVERY JOB

News from the Field

Industrial Film Reviews Controlled Blasting

A new 15-minute, 16mm sound film, involving unusual photographic techniques, shows how modern methods make blasting, once an instantaneous operation, an orderly and controlled sequence of events almost precisely adaptable to the type of rock, the surroundings, and the result desired.

This technical film, titled *The Inside Story*, is available for showing before mining, quarrying and construction engineers at company meetings or in professional society sessions. Where more complete discussions are desired, it may be supplemented with slide films to show special types and methods of blasting in sequence pictures. Some of the most revealing portions of the film itself owe their clarity to the use of a "machine-gun" sequence camera.

Produced by the Atlas Powder Co., the film explains the principles of blast detonation, discussing not only the practice of millisecond delay blasting but also the new refinement of that technique known as alternate velocity loading. Prints are available from Atlas offices at Wilmington, Del., New York, Tamaqua, Pa., Pittsburgh, Knoxville, Chicago, Joplin, Mo., San Francisco and Seattle.

States Provide More Highway Revenues

Further extension of the widespread trend of recent years toward increased highway-user taxes and highway bond issuance resu'ted from state legislative sessions throughout the nation this year.

New increases in gasoline tax rates were enacted in California, Iowa, Maryland, and Nebraska, with such a measure expected to be approved in Ohio. Similar bills were vetoed in Utah and killed in Connecticut, Delaware, Idaho, Indiana, Kansas, Massachusetts, Michigan, Minnesota, Montana, New Mexico, North Dakota, Oklahoma, South Dakota, Texas, West Virginia, and Wisconsin. Legislation extending added gasoline taxes imposed on a "temporary" basis was enacted in Colorado, Kansas, Nevada, Oklahoma, Pennsylvania, and South Carolina.

Truck operators will pay higher taxes in a number of states, but were spared, at least temporarily, from a threatened general wave of new ton-mile taxes. Although the ton-mile tax issue and variations of it are still pending in the Ohio legislature, proposals for such taxation, based on weight and mileage, were rejected by the legislatures of at least 18 other states —Arkansas, California, Colorado, Connecticut, Illinois, Indiana, Kansas, Maryland, Massachusetts, Minnesota, Montana, Nebraska, New Jersey, North Carolina, Oklahoma, South Dakota, Utah, and West Virginia. Bills providing for replacement of ton-mile tax laws with new systems of truck taxation were enacted in Idaho and Wisconsin, but application of New York's weight-distance tax statute was broadened.

States in which higher registration fees for passenger cars were enacted include California, Maryland, Nebraska, and South Dakota, with such a bill pending in Ohio.

Proposals for new bond issues or other forms of borrowing to finance free highway construction were given legislative approval in Maryland, New Hampshire, North Dakota, Oregon, Tennessee, and Washington; killed in California, Colorado, Idaho, Oklahoma, and Vermont, and await final legislative action in Delaware, Ohio, and Pennsylvania.

Wyoming lawmakers approved for submission to the voters at the 1954 general election a proposed state constitutional amendment to outlaw the diversion of highway-user tax receipts to non-highway purposes. Similar amendments, patterned after those already adopted by 24 states, were given initial legislative approval in Connecticut and Tennessee, but will require further action at the next sessions before going to the votors. Such an amendment also was passed by the Maryland legislature but was disqualified because of a technicality.

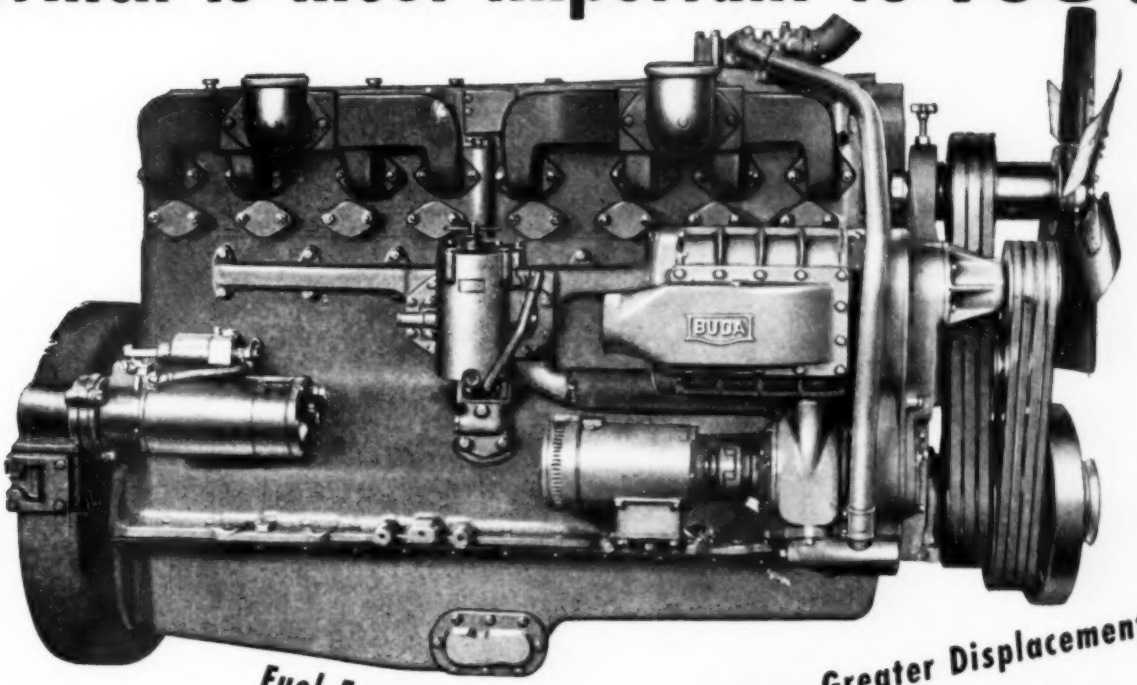
A million dollar salmon run was saved in British Columbia when four 15-ton trucks and six bulldozers came in to clear the Babine River of a huge rock slide.

Report Outlines Alabama Red Iron Deposits

Substantial recoverable reserves of red iron ore in two virtually undeveloped areas in Central Alabama have been outlined by Bureau of Mines trenching and drilling, a survey released recently by Secretary of the Interior Douglas McKay reports.

Continued on page 46

Which is most important to YOU?



Fuel Economy

Buda dyna-swirl combustion burns *all* the fuel—gives more horsepower hours per gallon

More Power—Greater Displacement

Buda Diesels have 13 to 25% more displacement—more power with greater reserve

Less Maintenance and Downtime

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Greater Lugging Ability... More Torque

You get 10 to 17% more torque at normal speeds—less shifting—faster trips

Longer Life... More Hours between Overhauls

Buda Diesels are averaging more than 6000 hrs. in toughest service

Parts and Service

Buda Parts and Service Facilities close to your operations

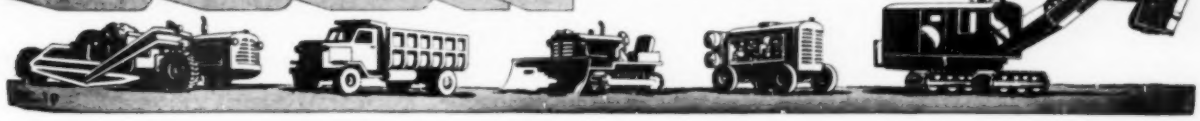
If it means MORE PROFITS... BUDA'S GOT IT!

Any way you figure it . . . the great new line of Buda dyna-swirl Diesels gives you more for your power dollar—more positive advantages that add up to profitable operation.

Get the facts today. They speak for themselves. Ask your nearby Buda Engine Distributor. Write for Bulletin 1526 and complete details. *The Buda Company, Harvey, Illinois.*

BUDA

a Power-Full and Dependable Engine
FOR EVERY NEED



Look at this GUARANTEED

"The M-R-S 150 is GUARANTEED TO SELF-LOAD a
of normal clay loam soil in a time of not
and a distance of not more than 125 feet."

With the M-R-S 150 powering your four-wheel scrapers you are *GUARANTEED* production that can make money for you. The outstanding traction and drawbar pull that permit the M-R-S 150 to *Self-Load* a 10 yard struck capacity scraper with such a tremendous guaranteed load also enable it to obtain heaping loads with a 17 yard struck capacity scraper *PUSHER-LOADED*.

M-R-S offers you all the big advantages of a rubber tired prime mover without losing the big investment you already have in scrapers — PLUS versatility that keeps all your equipment working.

Look at the facts and you'll agree . . . . M-R-S is the best DOLLAR-FOR-DOLLAR buy on the market today. Plan now to team your scrapers up with M-R-S for production, versatility and PROFIT!

PRODUCTION!

minimum of 22,950 lbs.

more than 75 seconds

Actual quotation from M-R-S performance guarantee

EXCLUSIVE WEIGHT TRANSFER

Exclusive WEIGHT TRANSFER provides additional drive axle weight which increases the contact area of the soft low pressure drive tires approximately 60%, producing superior traction.

SHORT TURNING DIAMETER

The short turning diameter and high maneuverability of M-R-S tractors when used to power four-wheel scrapers or bottom dump Mississippi Wagons makes them ideal in construction of narrow secondary roads. A short non-stop turning diameter of 28 feet to 34 feet is practical for all M-R-S tractors with different makes and models of scrapers.

M-R-S offers outstanding versatility, too. In a matter of minutes M-R-S provides power for bottom dump Mississippi Wagons, heavy compacting rollers, machinery trailers, or for general utility.

MODEL	M-R-S 125	M-R-S 150	M-R-S 190
Maximum Horsepower	125	200	275
Prime Mover To Self-Load Struck Yards	8	10	12
Pusher Load Struck Yards	13½	17	20

Let us prove this outstanding production to you! write, wire or phone for complete information.

THE EMBLEM M-R-S OF DEPENDABILITY

MANUFACTURING COMPANY

FLORA AND JACKSON, MISSISSIPPI, U.S.A.

News . . .

Continued from page 42

The Bureau's investigation was an early phase of its broad program of evaluating Alabama's red iron ore deposits. Ultimately, beneficiation and metallurgical tests will be made of the ores, but the work described in the present report consisted only of obtaining and analyzing samples from deposits in the Woodstock and Bucksville areas of Jefferson, Tuscaloosa, Bibb, and Shelby counties.

Outcrops of red iron-ore seams were discovered many years ago in both areas. However, only one attempt has been made to exploit the Woodstock deposits, which are estimated to have produced only 2,000 gross tons. Several mines have operated at various times in the Bucksville area, and the Bureau's report estimates production from this area at about 250,000 tons.

Bureau engineers collected 84 channel samples, representing about 318 linear feet, from 12 locations along the outcrops, and cores from diamond-drill holes totaling over 3,900 feet. On the basis of analyses of the samples, and assuming that 35% of the ore cannot be recovered, the report estimates recoverable reserves in both areas at more than 11 million tons of commercial-grade ore, more than seven million tons of marginal ore, and 18½ million tons of ferruginous sandstone.

Prepared by Avery H. Reed, Jr., Bureau mining engineer stationed at Tuscaloosa, the report gives the history and production of both the Woodstock and Bucksville areas. It also contains information on mining properties examined, and describes the general geology of the areas, the deposits and the character of the ore. Tabulated results of sample analyses are included together with drillhole logs and 20 illustrations.

A free copy of Report of Investigations 4981, *Investigation of Red Iron Woodstock and Bucksville Areas, Alabama*, can be obtained from the Bureau of Mines, Publications Distribution Section, 4800 Forbes St., Pittsburgh 13, Pa. It should be identified by number and title.

U.S. Air Force got this recent shipment of Le Roi truck-mounted 210 air compressors. Unique space and weight saving principle on units meets military needs.

Don't Let the Wrong BUCKET PICK YOUR POCKETS

When a bucket's too small, you lose pay load with every pass. When it's oversize, equipment wears out before its time. Either condition will pick your pockets systematically.

To be sure you have the right unit for the job, let Erie's field engineers survey your requirements. There's no charge. And you can be sure they'll come up with a helpful suggestion. They usually do.

For more about Erie Buckets and what they can do for you, write for Bulletin #403.

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Device Takes Sting From Exhaust Vapors

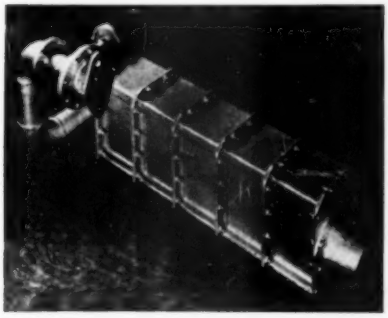
Exhibiting for the first time at a national trade show, Oxy-Catalyst, Inc., Wayne, Pa. equipped the gasoline engines of other exhibitors at the Fifth Materials Handling Exposition with its OCM Catalytic Exhaust System—a device that removes noxious carbon monoxide and hydrocarbon vapors from engine exhausts. During the five-day show at Philadelphia's convention Hall in May, Oxy-Catalyst, Inc. had two mechanics at its booth who installed the equipment without cost to the exhibitor.

By oxidizing the harmful and irritat-

ing fumes in engine exhausts to carbon dioxide and water vapor, the OCM muffler makes completely safe the operation of gasoline-powered equipment in enclosed, unventilated areas. The muffler was developed by Eugene J. Houdry, president of Oxy-Catalyst, Inc., and pioneer in the catalytic cracking of petroleum.

The basic unit of the OCM muffler is the Oxycat—a device which has gained national recognition in combatting air pollution and recovering waste heat energy from stack gases in industrial plants.

The Oxycat—in the OCM exhaust system—is a cartridge of spaced porcelain rods coated with a catalytic agent —catalytic alumina and platinum alloy. The engine exhaust flows across



OCM catalytic muffler removes harmful carbon monoxide and hydrocarbon vapors from engine exhaust, it is claimed.

the surface of these rods where combustion of carbon monoxide and other harmful vapors takes place. On leaving the catalyst the exhaust contains mostly carbon dioxide and water vapor, and only slight traces of the original contaminants.

The OCM muffler can be used on any engine — mobile or stationary — that runs on unleaded gasoline, Diesel oil or liquid propane gas.

Safety Council Releases New Literature

The National Safety Council's new *Handbook of Accident Prevention for Business and Industry* is a convenient safety guide for the manager of a small business or the supervisor of a department in a large organization.

The Safety Council also has just published the 1953-54 edition of the national directory of safety films. The directory provides the plant safety man with a comprehensive listing of 963 motion pictures and slidefilms for use in training personnel in occupational accident prevention. Films on home and traffic safety are included for the off-the-job safety program. Further information and prices can be had by writing the National Safety Council, 425 N. Michigan Ave., Chicago 11, Ill.

SAVE 3 to 4 hours
on every equipment move
with LaCROSSE TILT TRAILERS

MODEL LTA 4 — 6 or 8-ton capacity, 6½' x 14' platform

MODEL TSA 2 — 8 or 10-ton capacity, 8' x 16'7" platform

MODEL DTTA 4 — 13, 16 and 20-ton cap., 8' x 18'5" platform

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Easily loaded or unloaded in 5 min. by 1 man!

With a LaCrosse Tilt Top, your truck driver alone can handle the time-consuming job of loading and unloading equipment. No ramps to build! No blocking or cribbing! No high-priced labor crews tied-up on non-productive tasks! Just tilt . . . load . . . and you're ready to roll in 5 minutes. LaCrosse Tilt Trailers are economical to own . . . a size and model for every need. Write for prices and free descriptive literature.

. . . also standard low-beds up to 67 tons capacity

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Rush complete information on LaCrosse trailers:

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"I have preferred Hercules Red-Strand wire rope since 1909," says an operations superintendent. "I just wouldn't use any other." Another operator reports a truly remarkable record: "Red-Strand outlasted any other rope by three times!"
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Why do these men, among others, praise Red-Strand so highly? In a few words, it's because higher-than-rated quality in Red-Strand wire rope means longer-than-expected service . . . year in, year out.
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Crane . . .

Continued from page 19

ton ore hopper is an "import" from the Bull Shoals job. About 50% of the material from the pit winds up in this bin—another 13% to the waste pile as oversize, the balance in slimes. Material from the bin is trucked one-half mile to the mill site built above possible flood level. Here it is dumped to a belt conveyor which elevates to a 3,500-ton stockpile.

The 50-ton per hour capacity concentrating plant—operated by American Zinc, Lead and Smelting people—gets a uniform grade of ore by drawing on the stockpile from a number of different points by means of feeder conveyors. Processing is by a set of 51-in. rolls in a closed circuit with a 6 x 8-ft. trommel screen. Resulting minus ⅝-in. ore passes over 42 x 48-in. Harz jigs to a 6 x 6-ft. Traylor ball mill in closed circuit with a Wemco 36-in. spiral classifier.

Jig and table tailings are elevated to the top of the mill and laundered to the jig trailing pond. Minus 65-mesh classified overflow goes to flotation where lead is floated in a four-cell Denver equipment "Sub A" unit. Lead tailing passes to a Denver conditioner where zinc is floated in two six-cell "Sub A" machines. Iron pyrite and marcasite is depressed during flotation to flotation trailings. Lead and zinc concentrates are filtered and trucked to railroad shipment to East St. Louis smelter.

New Contribution to Mining

Although most pit and mill equipment at Quick Seven is new and handles a large flow of material, the operation is not unusual except for the application of the hammerhead crane. The 225-ton, 110-ft. high, 300-ft. long rig was brought from Bull Shoals as an experiment, has completely convinced the joint venturers. Its fast operation and bonus value in getting trucks and other equipment into and out of the pit offer clear proof of a new and important contribution to the science of open-pit mining made by the heavy construction industry.

"We used the crane here because it was available" reports Pit Super Pope Schoenberger, "and if tonnage is available another outfit might find it profitable to build such a rig specifically for use on a similar project."

PAYS OFF WITH *More Paydirt!*

BIGGER LOADS EVERY TRIP . . .

You get heaped loads faster with a Bucyrus-Erie scraper's boiling-action loading. This has been proved time and time again in actual field tests. The loading action breaks up big chunks to give you a compact and uniform fill, and extra pounds of dirt in every cubic yard.

MORE TRIPS PER DAY . . .

Big tires, low center of gravity and increased all around stability give you the flotation and maneuvering ability for extra trips every working day. The streamlined gooseneck permits short turns. Dumping is quick and clean with positive rolling ejection. It all adds up to faster hauling cycles . . . and more dirt moved per day.

See your International Industrial Tractor Distributor soon for all the facts about the Big Red Team . . . it will pay you to use the equipment that delivers the most paydirt for your money.

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THREE *B*-TYPE SCRAPERS TO CHOOSE FROM

Model	Capacity	
	Struck	Heaped
B-250	22 cu. yd.	27½ cu. yd.
B-170A	16 cu. yd.	21 cu. yd.
B-113	10 cu. yd.	14 cu. yd.

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SEE YOUR INTERNATIONAL INDUSTRIAL TRACTOR DISTRIBUTOR

Equipment

You Ought to Know About

Heavy Duty Ripper

Manufacturer: Hensley Equipment Co., 816-98th Ave., Oakland, Calif.

Claims: A new over-the-mold-board heavy duty ripper can be used on all medium and large dozers.

Carefully selected and heat treated steels make the ripper rugged enough to absorb the toughest ripping jobs. It is a valuable tool for the contractor where grade has been lost or corner cuts required. Up to six units can be used on a dozer for grubbing, clearing, and rock raking. Leading construction firms are already using this ripper with excellent results.

The complete unit weighs about 300 pounds. This feature makes it possible for one man to handle the ripper.

Cat Overdrive

Manufacturer: Caterpillar Tractor Co., Peoria 8, Ill.

Claims: An overdrive for the DW20 four-wheeled Tractors which gives a top speed of up to 34 mph has been developed by the manufacturer.

On DW20s with the 15.75 to 1 final drive reduction, the maximum speed with overdrive is now 34 mph, an increase of eight miles per hour over a similar unit without overdrive. Addition of overdrive to Tractors with the 21 to 1 final drive reduction increases the top speed five miles per hour from 20 mph to 25 mph.

Combined with the present standard transmission, the overdrive gives the Tractor a range of 10 speeds forward and two in reverse. Overdrive is now

available as an attachment on new machines coming from the factory or for installation on units now operating in the field.

This attachment, a compact unit entirely designed and built by the manufacturer, is mounted between the engine and transmission of the Tractor and is controlled by a manually operated shift lever located next to the regular gear shift lever.

Installation requires a special transmission front cover, a clutch shaft and a universal joint, all of which are supplied as part of a special package the company has available for field installations. The only other modification required on the DW20 is cutting a slot in the floor plate for the overdrive shift lever. The seat does not have to be removed to install this unit.

Conveyor Lubricator

Manufacturer: Stewart-Warner Corp., 1826 Diversey Pkwy. Chicago 14, Ill.

Claims: Lubrication of conveyor trolley wheels has been made automatic, certain, and safe by a new lubricator.

The Alemite lubricator delivers a pre-set, constant shot of either oil or lubricant to each trolley wheel on each side of the conveyor system into which it is installed, simply by the flick of a switch. When every wheel in the system has been serviced, the system may be switched off and is in readiness to go into operation again at whatever lubrication interval load and other conditions require.

The entire unit is contained on a section of I-beam 37¾ or 40 inches in length which is fitted into the conveyor track at any convenient spot in its length, so long as the location is within reach of the house air line and a 115-V., 60-cycle electrical outlet. Head-room of 22 inches over the top of the I-beam is required.

As each wheel reaches the spot on the track at which the lubricator is installed, a coupler clamps the lubricant fitting on its hub and delivers the required amount of lubricant or oil. The coupler instantly disengages and is ready for the next wheel.

As the applicator and coupler engage the grease fitting on each wheel, a pressure of from 800 to 1,000 pounds is applied to force the lubricant into the bearing. The amount of lubricant can be adjusted to .005 cubic inch—enough for 32,000 shots from the five-pound grease or 2½-quart reservoir.

Dump Body

Manufacturer: Galion Allsteel Body Co., Galion, O.

Claims: A special 5.3-yd. corrugated steel dump body for hauling "hot materials" weighs 2730 lbs.

Although the body was designed primarily for the steel industry, it is suitable for many other uses such as transporting heated aggregates for roof coating and flooring, "hot mix" road materials, hot castings, etc. A particular recommendation is for jobs involving heavy shovel loading of extremely abrasive materials.

The hoist cylinder, pump, and control valve is protected from the heat by an asbestos lined steel cover, designed and mounted to move freely with the action of the hoist cylinder.

Body sides and floor have full length corrugations. Sides are con-

structed of eight gauge steel and the floor is ¼-in. steel plate. Sides fold into the body floor at a 45° angle to prevent material from lodging in corners. This angle is reinforced with eight gauge steel gussets at the body side braces.

The body head has box-top horizontal bracing and full height box-type side bracing that extends up under a four-inch roll for additional strength.

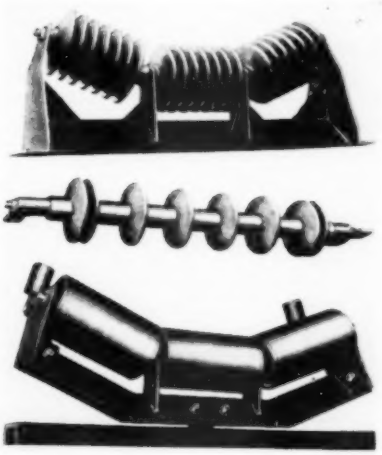
Overall body length is 114 inches including a 30-in. scow with a 15° angle. Scow eliminates need for a tailgate on hot material hauling operations. Inside body width is 82 inches with 31-in. sides and head.

The ¼-size cab protector is constructed of eight gauge steel. Dumping is handled by a Model 700 hydraulic hoist.

Conveyor Idlers

Manufacturer: Pioneer Engineering Works, 1515 Central Ave., Minneapolis, Minn.

Claims: Three new items of idlers



have been announced by the manufacturer.

Mesabi type impact idlers: Each of the three rolls of these new Mesabi type impact idlers are equipped with Goodyear rubber segments 6¼-in. diameter, 1⅛-in. wide, mounted side by side on a 2¼-in. O.D. seamless tube.

Primarily designed to absorb the shock of falling material and thus prevent undue cutting and wear of the belt, flexibility of the segments permits the belt to run smoothly over the idlers even though the material may not be evenly distributed on the roll. Trough of left hand and right hand rolls—22°.

Self-Cleaning return idlers: New Mesabi self-cleaning return idlers are of single roll construction and equipped with Goodyear rubber roll segments, 6¼-in. diameter, 1⅛-in. wide, 2¼-in. bore. Two of the segments are mounted side by side on each end of the roll. Additional segments (2, 4, or 5, depending on the width of the conveyor) are evenly spaced on the roll to permit the conveyor belt to travel freely without a build-up of material on the roller.

Self-aligning troughing idlers: Two outstanding features on the new 6-in. diameter self-aligning troughing idlers are: (1) The troughing idler frame is mounted on a pivoted base, and (2) the conveyor belt rides between two guide rollers—one guide roller is mounted on each end of the set of troughing idlers.

When the weight of the material on the conveyor belt is unbalanced, self-alignment of the idlers is assured because they swing freely to the left or right on the pivoted base. At the same time, the guide rollers hold the conveyor belt in line. Trough of left hand and right hand rolls—22°.

All idlers are available for 24-in., 30-in., and 36-in.

Dozer-Loader

Manufacturer: Teale & Co., P. O. Box 308, Omaha, Neb.

Claims: A new combination Dozer-Loader designed to give the user a low-priced unit, which can be put on a regular crawler tractor (no modifica-

Above, a 2½-cu. yd. Crescent scraper is used on a 1-cu. yd. boom dragline and the yardage rises to 270 cu. yd. per hour. The scraper is taking gravel from a roadside pit and delivering to a movable truck loader.

In this picture a Crescent scraper hangs from a trolley that rides on a slack cable extending from the tip of the boom to an anchorage across the river. Thus, it is able to excavate far beyond the reach of the boom and haul material onto the bank.

A Sauerman Crescent Scraper will repay its moderate-initial cost many times over when added to your boom machine as auxiliary equipment. Simple to rig up, it increases the machine's capacity when used on specific job operations mentioned below.

For backfilling, grading and other jobs where material must be moved but not lifted, the conventional casting method is used. The Crescent bites into and gathers the load with the ease of a plowshare, then hauls at ground level and deposits the load automatically when the forward pull is reversed. Machine strain and power consumption required to lift and swing the load to the discharge point are eliminated.

To dig material from a river, deep pit or soft area beyond the reach of the boom, another method is used to rig the Crescent Scraper to the boom machine. For such work the Crescent is suspended by chains from a simple trolley that rides on a track cable extending from the tip of the boom out to a movable anchorage. Digging, hauling and discharge proceed as in the casting operation. Following discharge, the empty scraper is lifted and gravity-returned to the excavation point merely by tightening the track cable.

Any boom machine will handle a Crescent of larger size than its regular dragline and clamshell bucket. The Crescent is much lighter, size for size, than these buckets. Digging power and strength are derived from the Crescent's bottomless construction and flowing lines—not from weight of metal. Users of boom machines can obtain full information by writing for illustrated literature describing how other operators use Sauerman Crescent Scrapers on their machines to increase output and reduce costs.

SAUERMAN BROS., INC.

574 S. CLINTON ST., CHICAGO 7, ILL.

tions), is now being manufactured. The Dozer-Loader can be readily put on or taken off, so the tractor can be used for other types of work.

It eliminates the need for two tractors—one for a loader, one for drawbar work. Ruggedly constructed, the Dozer-Loader can be quickly installed by bolting to the mounting positions on all crawler tractors.

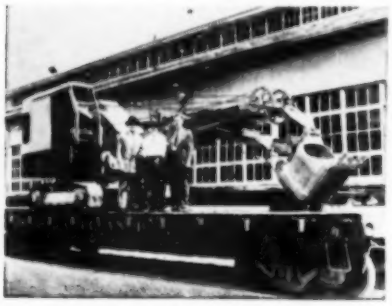
The Dozer-Loader is specially designed to fit close to the front of tractor for better leverage and lifting power. The front edge of the bucket can be lowered to a point below the tractor tracks making it possible to clean up ahead of the tractor. Bucket raises to a height of 8½ feet—when dumped at this height an automatic "bump" on the bucket cleans out sticky soil and similar material.

Raising and lowering is handled hydraulically from the tractor seat. The bucket can also be gravity dropped by setting the Hydreco detent valve in float position. To raise bucket, valve lever can be hand operated—starting and stopping the bucket in any position or can be set, freeing the hands for shifting gears or turning tractor. The new models are said to stand up under the roughest use and are equipped with a special "grader-blade" cutting edge that can easily be removed.

½-Yd. Shovel

Manufacturer: Koehring Co., Milwaukee 16, Wis.

Claims: A newly designed crawler



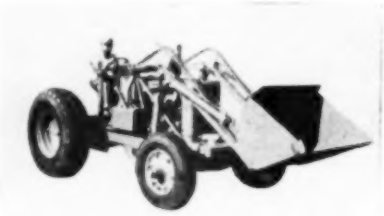
mounted ½-yd. excavator has a 29% increase in lift crane capacity. The increase in lift capacity rating from 7½ to 10-ton is due principally to changes in engineering design which relocated upper machinery behind the excavator's center of rotation. By simplifying the upper machinery design to two principal horizontal shafts, the Model 205 provides easy accessibility for all maintenance work. In addition, the machine is equipped with carburized steel gears, flame hardened for greater strength and fully enclosed for constant, dirt-free lubrication.

Self-energizing brakes on the new Model 205 are automatically engaged at all times and require no adjustment for the life of the brake lining. The machine cannot accidentally "run away" and can be released by tractive power only when applied by the operator with a single jaw clutch lever.

Levers and linkage revolve on antifriction bearings to lessen backlash and provide better feel of loads. Only four levers, all within easy reach of the operator, are required for controlling any machine movements.

The four individual hook and turntable rollers are mounted on nonmetallic bushings. Each is adjustable for wear by means of a simple eccentric. The improved dipper trip arrangement operates off an electric solenoid with button control located on one of the operating levers.

Front-End Loader



Manufacturer: Dept. KP, Baker-Lull Corp., 314 W. 90th St., Minneapolis 20, Minn.

Claims: The combination of cheap Diesel power with front-end loading up to 5,000 lbs. capacity is featured in a new Shoveloader, mounted on a Sheppard industrial wheel-type tractor.

The manufacturer points out that Diesel power will return fuel cost savings up to 75% compared with the operation of gasoline powered equipment. Other advantages include extremely low replacement costs, an eight-speed transmission that permits full throttle operation at each job speed, and the design of Sheppard tractors for use in critical conditions of mud, water, and uneven ground.

The Shoveloader will crowd and dig below tractor level, lift a 5,000 lb. capacity load to 10-ft. 3-in. dump it at 8-ft. 6-in., and reach 5-ft. 10-in. ahead of the tractor radiator shield. Lift speed is 12 seconds; lowering speed, nine seconds. Special double-acting hydraulic cylinder design enables the operator to shake the materials bucket thoroughly clean, adding to operating efficiency.

The unit is engineered for clear visibility ahead in critical loading or unloading positions, and all actuating parts are located well ahead of the operator for safety.

Tools available with the Shoveloader include a material bucket, combination coal and snow bucket, bulldozer, lifting crane, sweeper (for snow clearance and clean-up), rear leveling blade scarifier, and logging fork.

Pipe Line Drill

Manufacturer: Schramm Inc., West Chester, Pa.

Claims: The Twin Boom Pipe Line drill represents a practical rock drilling outfit for pipe line trenching. Completely mechanized, the twin drill air feed assemblies and drifters are suspended from crawler tractor booms.

With a Schramm 600 cfm Diesel engine compressor towed for the power unit, the TBD-126 becomes a self-contained continuously moving drilling unit.

The four-inch Drifter used in the TBD-126 drill has the hitting power and strong rotation that makes for fast drilling with an efficient hole cleaning blow. No steel change is required for normal drilling as actual feed is eight feet.

Heavy-Duty Dozer

Manufacturer: Holt Equipment Co., Independence, Ore.

Claims: Improved design and use of a new alloy, Ductilite, an International Nickel Corp. research development, reduces weight at vital balance points in a new heavy-duty dozer. Actual weight reduction in the frame is close to one-fifth.

The new model has extra high lift and versatility and is controlled by an improved finger-tip control hydraulic system that may be used for other equipment when the dozer blade is disconnected.

Welding Product

Manufacturer: Sight Feed Generator Co., West Alexandria, O.

Claims: The Rexarc Automatic Welder and Positioners are designed to replace by automatic procedure large numbers of welding operations previously done by hand.

Features of the new equipment include: Provision for both low and high voltage welding; high frequency start-

Continued on page 56

GM DIESEL
CASE HISTORY No. IC9-85

OWNER: Rose Construction Co., Atlanta, Georgia

INSTALLATION: GM 2-71 Diesel, replacing a gasoline engine in ½-yd. backhoe.

PERFORMANCE: Shovel now works faster, maintains the load and doesn't stall. Previous engine was burning 35 gallons of gasoline in 8-hour day; GM Diesel uses only 6 to 8 gallons of Diesel fuel per day.

It pays to STANDARDIZE on

GM
GENERAL MOTORS
DIESEL POWER

SWITCH FROM GASOLINE TO GM DIESEL SLASHES FUEL COST

You can see from the above that it won't take long for this General Motors Diesel to pay for itself out of fuel savings alone. Add the extra work it does every day—the lower cost of maintenance—increased equipment availability—longer engine life—and you'll see why buying a GM Diesel is one of the best investments you can make.

The GM Diesel starts at the push of a button—uses fuel in direct proportion to the work it does. It gets work done faster because with 2-cycle operation it accelerates faster under load changes. And because of its smaller size, it often fits where other Diesels won't.

If you have equipment that needs new life, contact your GM Diesel distributor. He will analyze your power requirements and show you in dollars and cents how much this engine can save for you. No obligation, of course.

DETROIT DIESEL ENGINE DIVISION
GENERAL MOTORS • DETROIT 28, MICHIGAN
Single Engines . . . 16 to 275 H.P. Multiple Units . . . Up to 840 H.P.

RUGGED "Individuals

THAT'S THE BUCYRUS ERIE LINE OF 3/8 - TO 4 - YARD EXCAVATORS . . .

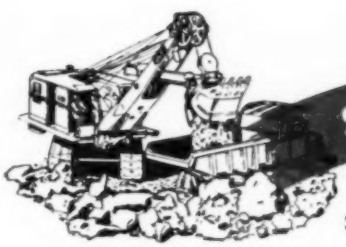
Each model is *individually designed* all the way through from crawler treads to boom point sheaves for a definite size payload. Maximum stability and maximum strength are obtained without that extra weight which slows down the operating cycle or adds to power consumption.

That's because each part is built of tough special steels, developed especially for the individual duties involved. No parts are too small — strength is built in where you need it. No parts are too big — bulky deadweight is eliminated. This is Bucyrus-Erie *individual design.*

Because of *individual design* you can always be sure that your Bucyrus-Erie excavator will carry out the work it is rated for with speed, safety, and at low maintenance cost. Ask your nearby Bucyrus-Erie distributor to give you complete details. 16E53C

BUCYRUS-ERIE COMPANY

SOUTH MILWAUKEE, WISCONSIN

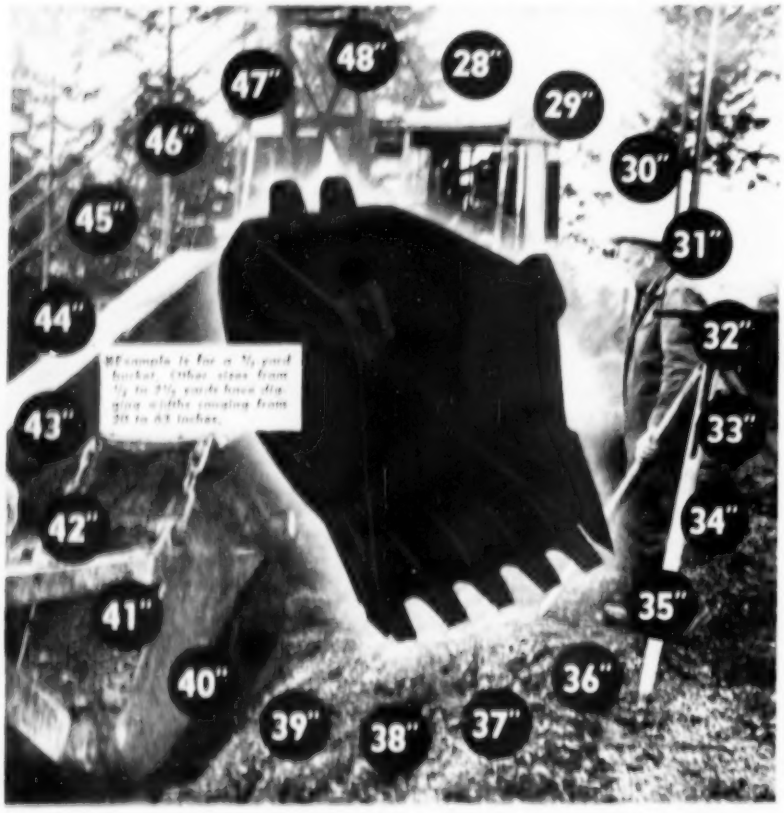


See Your Bucyrus-Erie Distributor

SHOVELS • DRAGSHOVELS • DRAGLINES • CLAMSHELLS • CRANES

DIG TRENCHES — WITH ONE MACHINE

RIGHT to the INCH



ESCO FASTBACK Hoe Dipper Eliminates Unnecessary Digging and Backfilling

The ESCO Fastback hoe dipper digs a trench the width your contract calls for — right to the inch. You don't waste time and money on unnecessary digging and backfilling — and you dig all your trenches with one machine.

For example, the ¾ yard Fastback dipper is made in three basic widths. By changing side cutters each basic unit gives you seven different widths. Result — one machine equipped with three ¾ yard Fastback dippers and side cutters can dig trenches anywhere from 28" to 48" wide — to full ¾ yard capacity — without overload. Other ESCO Fastback hoe dippers give you digging widths from 20 to 63 inches.

Put the money saving ESCO Fastback to work on your trench digging jobs. Your ESCO representative will be glad to demonstrate, or write for Descriptive Bulletin 180.

FASTBACK DESIGN eliminates heeling action — gives clean, fast dumping.

ESCO

Representatives in all Major Cities

Offices and Warehouses: Honolulu, Hawaii; Houston, Texas; New York, New York; Los Angeles, San Francisco, California; Seattle, Spokane, Washington; Canada; Pennsylvania; Eugene, Oregon; Salt Lake City, Utah; In Canada: Vancouver, British Columbia and Toronto, Ontario.

ELECTRIC STEEL FOUNDRY CO.

2141 N. W. 25th AVENUE, PORTLAND 10, OREGON 512 NORTH ST., DANVILLE, ILL.

New Equipment . . .

Continued from page 52

ing and stabilization, assuring a steady arc at all times; control over low arc voltage and amperage, which minimizes stress and dilution of parent metal. Welding can be lineal or cross-head on flat or circular shapes, continuous or in sequence. Removable head is transferable.

Welding on shafts, rollers, sheaves, idlers, and similar circular surfaces is simple since rotating spindle is vertically adjustable to accommodate a large range of work sizes. Angular positioning for welding idler and roller flanges, crusher mandrils and similar applications is accomplished by hydraulically controlled elevating device. For welding on long circular work, supporting trunnions equipped with friction bearing rolls are available.

Dump Trailer

Manufacturer: Hercules Steel Products Corp., Galion, O.

Claims: Two new telescopic hoist dump trailer units specially engineered to increase legal payloads and improve dumping performance are now in production.

The two units, available as standard packages, are a 17-ft. single axle trailer with 10 to 17 cubic yards capacity, and a 20-ft. tandem axle unit with a capacity range from 12 to 26 cubic yards.

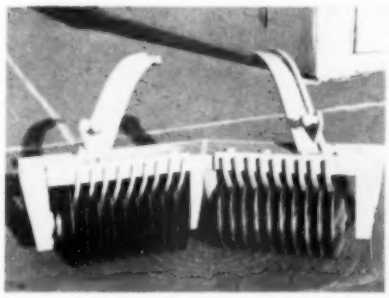
Highlights of the new design are the extreme front mounting of the three and four sleeve twin telescopic hoisting

mechanisms and the simplified method of packing the telescopic joints, the latter resulting in reduced maintenance costs. Benefits of the hoist front-mounting principle, to contractors and material haulers, are announced as lower hydraulic pump pressures, improved per-axle gross loadings, better over-all dumping stability, and up to 2,000 pounds increase in legal payloads.

Although the complete packages are available on a "ready to roll" basis, the hoists and bodies may be obtained separately for mounting on any make trailer chassis.

Available on request is a new catalog sheet that illustrates and describes the two dump trailer packages.

Road Disc



Manufacturer: T & M Manufacturing Co., 1920 Niles St., Bakersfield, Calif.

Claims: A new road disc mountable on the scarifier controls of all models and makes of motor graders effects a savings in time, cost, and manpower. Shav-O-Disc leaves the grader blade in free operation, cuts 64 inches in width and at desired depth, operates under full weight of the motor grader.

All parts of Shav-O-Disc are replaceable from standard stocks and the complete attachment weighs 1,740-lbs.

The new disc attachment, mounted on the scarifier controls of the grader where it belongs, is the gang type in two sections opposed, which takes out the side thrust and does a complete job of work on black top roads. Shav-O-Disc has individual disc cleaners hard-faced for long wear.

Ditcher

Manufacturer: Barber-Greene Co., 400 N. Highland Ave., Aurora, Ill.

Claims: A new "Runabout" ditcher is the Model 705-B. The new design adds a complete fluid coupling to the fully field-proven "Hydra-crowd" hydraulic transmission which was a feature of the predecessor Model 705-A.

A second innovation is the design of a special curved-tooth bucket line which greatly increases digging efficiency and assures more than double the normal digging tooth life.

A heavy duty Chrysler industrial engine transmits its power through a Chrysler fluid coupling, to the special "Hydra-crowd" transmission. The digging mechanism is protected at all times by a constant hydraulic cushion that eliminates shocks, surge loads, and permits application of full engine horsepower to the task of digging.

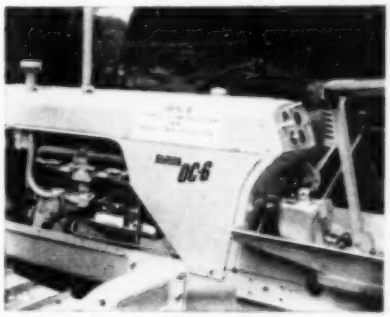
A final refinement of design in the hydraulic drive mechanism is a counter-balance valve which provides positive elimination of "run-away" tendency when the machine is digging on a down-hill slope. The valve maintains constant crowding speed, resisting gravitational pull on the machine.

Curved digging teeth of special design have greatly increased the digging efficiency of the machine through longer tooth life, easier replacement, and effective discharge of the stickiest of soils, plus more efficient operation. Since the curved tooth has the same longitudinal cross section from tip to shoulder, it remains sharp until worn down to the point of discard. Both ends of the tooth are identical in shape. When one end is worn, a retaining pin is knocked out, the tooth is reversed and the pin is replaced. This insures at least double the normal tooth life.

Cranking Motor

Manufacturer: Hydramotive, Inc., 2323 E. 67th St., Dept. H-14, Cleveland 4, O.

Claims: The Hydrotor is designed for quick starting of heavy duty engines. It eliminates the use of storage batteries and electric or pneumatic starters for cranking these engines.



Hydrotor has a record of developing quick starting on heavy duty engines at both sub-zero and at extremely high temperatures. Hydrotors come in three sizes to fit and crank most internal combustion engines (Diesel or gas).

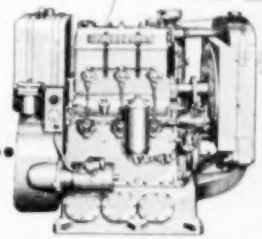
For installations requiring frequent starting, a small displacement engine driven pump and unloading valve are furnished to automatically recharge the hydraulic accumulator during engine operation.

The complete system, including the automatic recharging pump will operate in the same manner as an electric or pneumatic system. However, the advantages of the Hydrotor hydraulic cranking system is that energy can be readily restored to the accumulator by a few strokes of the hand pumps whereas a discharged battery or a depleted air receiver may result in complete failure of the motive power.

Continued on page 60

12 POWER COMBINATIONS

available with NORDBERG DIESELS



1 - 2 and 3-cylinder models for 4 types of service

1. For MAIN or STANDBY ELECTRIC SERVICE . . . Your choice of 1, 2 and 3-cylinder units, providing from 6 to 30 K.W. (6,000 to 30,000 watts) in Direct and Alternating Current—50 and 60 cycles.
2. For STRAIGHT POWER TAKE-OFF . . . Your choice of 1, 2 and 3-cylinder units, with stub shaft power take-off to meet power needs from 10 to 45 hp.
3. For CLUTCH-POWER TAKE-OFF . . . Your choice of 1, 2 and 3-cylinder units, from 10 to 45 hp, with twin-Disc clutch power take-off.
4. For PUMPING SERVICE . . . In 1, 2 and 3-cylinder units for connecting to pump shafts—for electric pumps—or with close-coupled centrifugal pumps—in capacities from 200 to 3000 gpm at 15 to 240 ft. total head.

With 12 basic power combinations, Nordberg Diesel units offer you an extremely wide selection to help you get exactly the right kind of power to meet your specific requirements.

NORDBERG MFG. CO., Milwaukee, Wis.

NORDBERG
BUILDERS OF AMERICA'S LARGEST LINE OF HEAVY-DUTY DIESELS

— MAIL THIS COUPON TODAY —

Nordberg Mfg. Co., Milwaukee, Wis.

Send catalog covering Nordberg Type 4FS Diesels. I am interested in a unit for the following service: EE

.....

Your Name .....

Company Name .....

Address .....

City ..... Zone .... State ....

4-453

increases hourly yardage output over 10% with Koehring *fast-shuttling* DUMPTORS

THERE is no need to turn at the loading unit, along narrow haul roads, or on the fill with fast-shuttling 6-yard Dumptors. Koehring constant-mesh transmission gives the same 3 fast speeds forward and reverse, lets Dumptors operate with equal ease in both directions. Every turn saved cuts 15 seconds off your cycle time, and adds up to an important increase in yards hauled per hour. Here's a typical example:

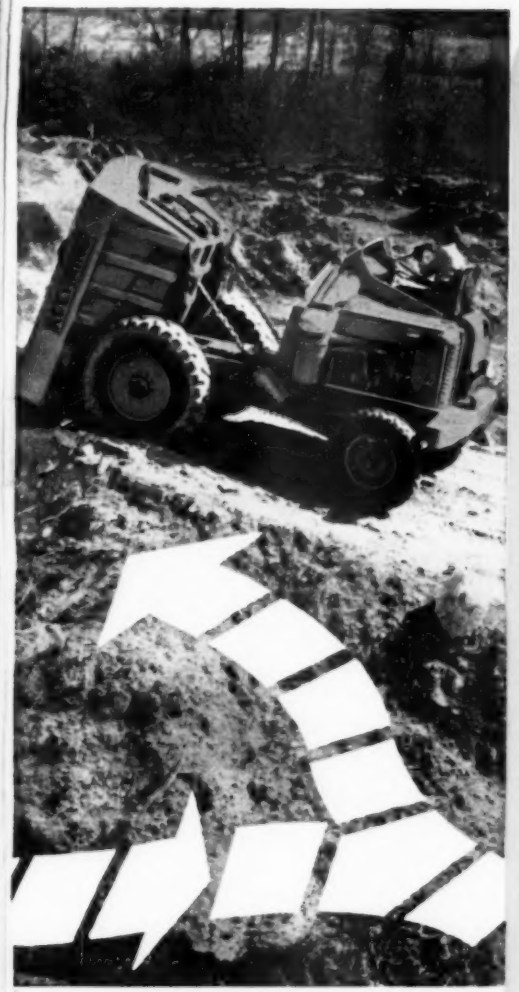
On a 1,000-foot haul, eliminating only 2 turns saves ½ minute every round trip. Where you would get an average of 13.6 trips per hour with 2-turn operation, Dumptor *no-turn shuttle hauling* gives you 15.4 trips — an increase of 1.8 trips an hour on the same 1,000-foot haul.

Fast, easy spotting and 1-second gravity dump help keep production high. Costs stay low because there are no complicated, mechanical body hoists to slow up haul cycles — no expensive hoist maintenance or down time to eat into your profits. Let your Koehring distributor show you Dumptor's many other cost-cutting advantages.

KOEHRING COMPANY, Milwaukee 16, Wis.
Subsidiaries: JOHNSON • PARSONS • KWIK-MIX

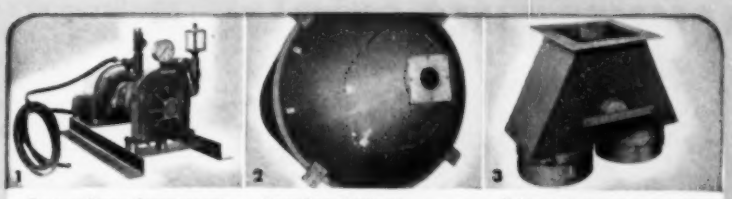
KOEHRING DUMPTOR®

CE233



This mountain-side job shows typical no-turn shuttle advantage. Hauling along narrow ledge, Dumptor spots close to Koehring 1½-yd. 605, gets its load, drives to fill, dumps, returns to shovel — without turning.

INCREASE BATCH PLANT PROFITS
with Johnson accessories



Rotary Vane Compressor gives 7 cu. ft. air pressure per min. cement aeration. 15-lb.-limit relief valve.

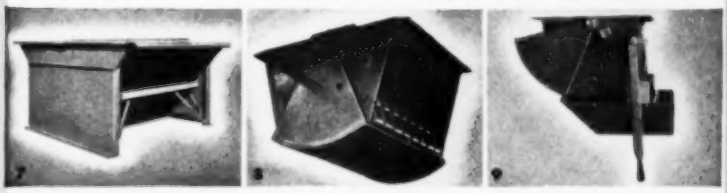
Aeration Fittings properly spaced in Johnson bins and silos keep cement free flowing.

2-Way Elevator Discharge Valve, a flop-type chute, directs flow of cement to the storage tank.

Pivoted Distributor feeds aggregates to bin sections. Positions and locks by ground control wheel.

Bin Signals accurately register high and low levels in cement or aggregate. Dust-proof.

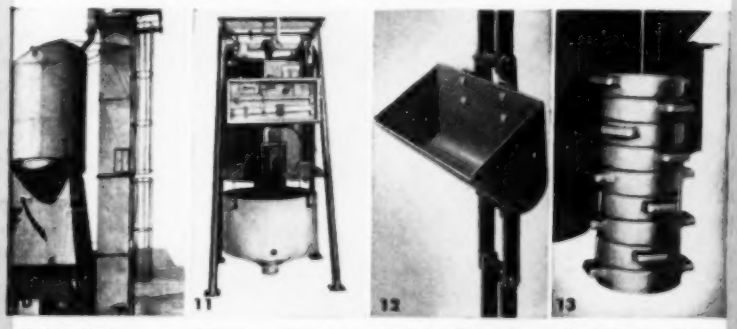
Rotary Plug Valve accurately controls cement flow. Plug operates freely in self-aligning bearings.



Receiving Hopper 30 and 50-bbl. sizes, feeds bulk cement to elevator. All-welded, weather-proof.

Aggregate Fill Valves single clam, radial type for jam-proof closing. Hydraulic pressure lubrication.

Tunnel Gate for stockpile reclamation. Single radial clam. Skirt board is hinged, opens and locks securely.



Safety Cage of 28" steel, welded to casing, can be furnished with all Johnson elevators.

Water Weigh Batchers, semi- or full-automatic types. 120 and 240-gal. sizes available.

Elevator Buckets in many sizes for aggregates, and cement. **Steel Chain** has carburized knuckles.

Batcher Test Weights in sets of nine, 50-lb. calibrated units, and two 25-lb. steel hangers.

Mail to **C. S. JOHNSON COMPANY**
CHAMPAIGN, ILLINOIS
(Koehring Subsidiary)

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NAME _____ TITLE _____

COMPANY _____

STREET _____

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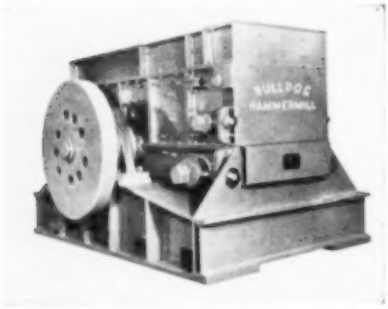
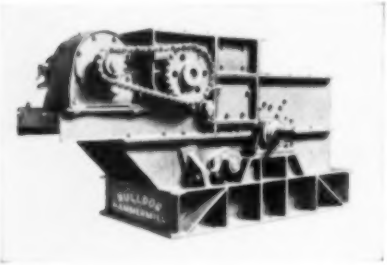
Twice the Capacity with
15 Times the Hammer Life

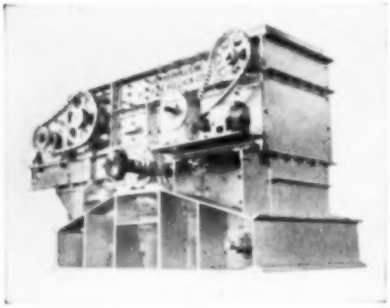
BULLDOG
HAMMERMILLS



FOR DRY MATERIALS—Stationary Breaker Plate type. Pettibone *manganese steel* hammers, liners, cage bars, and adjustable breaker plate assure the highest efficiency of any hammermill.



NON-CLOG FOR WET MATERIALS—Wet or sticky materials flow rapidly across moving breaker plate. No over-size discharge—no fine material accumulation on lower breaker plate shaft.



NON-CLOG WITH CLEANING BAR—Highest producer for exceptionally wet materials. Capacity all models illustrated, 1 to 1000 tons per hour—primary, secondary, or fine reduction.

Ask for Bulletin **534**

HAMMERMILLS, INC.

Subsidiary of PETTIBONE MULLIKEN CORP.

4700 WEST DIVISION STREET
CHICAGO 51, ILL. • SPaulding 2-9300

New Equipment . . .

Continued from page 57

Welding Transformer

Manufacturer: General Electric Co., Schenectady 5, N. Y.

Claims: A new 400-ampere single-phase a-c welding transformer with a 60% duty cycle provides a current range of 40 to 500 amperes. Designated G-E type WK40K, the new welder can be used with a variety of electrode sizes for repair, maintenance, and construction work.

The new transformer incorporates arc-stabilizing capacitors which make it easier for operators to strike and maintain an arc without popouts. This results in faster travel speeds, fewer "patch ups," and stronger welds.

The extra-wide current range allows the use of this one machine for a wide variety of applications, from light-duty, low-current sheet metal jobs to heavier-duty, high-current industrial work. A range switch enables the operator to change quickly from high to low currents or vice versa.

Other advantages of the new welder are longer coil life, because of silicone insulation, stepless current control permitting accurate adjustment, and built-in idlematic control for protection against electric shock.

The new welder is 44 inches high, 22⅝ inches in diameter, and weighs 355 lbs.

Hydraulic Excavator

Manufacturer: Cone Automatic Machine Co., Inc., Windsor, Vt.

Claims: A completely re-engineered model of the tractor-powered, hydraulic Pippin-excavator has appeared on the market. Deluxe Model WF-104 attaches to light tractors such as Ford and Ferguson, and is being adapted to other makes of tractors.

It excavates more than 10 feet deep, and will lift to a height of 12 feet for truck loading. Its 16-ft. reach behind

the tractor means that a 10-ft. long trench can be dug without moving the tractor. Wider side swing (12½ feet from center) allows piling of dirt farther from the excavation.

The excavator is rigidly supported by its two hydraulic stabilizers, which relieve the tractor of the working stresses, and assures digging of plumb ditches on uneven ground or on slopes up to 15°. The greater hydraulic tank capacity provides better oil cooling under extreme working conditions.

The national distributor of this excavator is Pippin Construction Equipment, Inc., White River Junction, Vt.

Anti-Freeze

Manufacturer: E. I. du Pont de Nemours & Co., Inc., Ammonia Dept., Wilmington 98, Del.

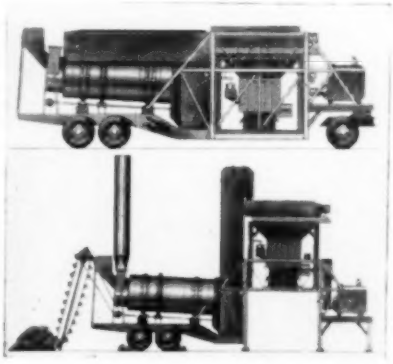
Claims: Zerex, Du Pont's premium-type anti-freeze, is now available in 54-gal. drums.

Asphalt Plant

Manufacturer: Standard Steel Corp., Los Angeles, Calif.

Claims: The new portable, batch-type asphalt plant is of 1000-lb. capacity and is mounted on its own rubber-tired wheels. It is complete with its own gasoline or Diesel engine.

All that is required to place the portable unit plant in operation is to raise the mixing unit by means of an elevator device. Within a few hours



from the time this portable unit is spotted into position, it is ready for operation.

In transit the plant complies with highway clearances involving both height and weight and may be towed with a truck-tractor.

Electronic Trouble-Shooter

Manufacturer: Anco Instrument Division, 4254 West Arthington St., Chicago 24, Ill.

Claims: A new portable electronic instrument for locating sources of trouble in all types of construction equipment is known as the Elec-Detec. This electronic stethoscope can be utilized for locating friction noises

in bearings, pistons, gears, ratchets, cams and clutches.

The instrument uses a metal probe which serves as a microphone to locate the exact source of tell-tale noise. Sound impulses are transmitted through an amplifier to headphones. Sounds can be detected at low speed that otherwise would be heard only at high speeds. Elec-Detec is furnished complete with batteries and leather carrying case.

Speed Grader

Manufacturer: Pettibone Mulliken Corp., 4700 W. Division St., Chicago, Ill.

Claims: Five Speed Grader sizes now available are the 65 hp, 83 hp, two 100.2 hp, and the 107.8 hp.

Advantages to users include line production and a strong parts replacement program.

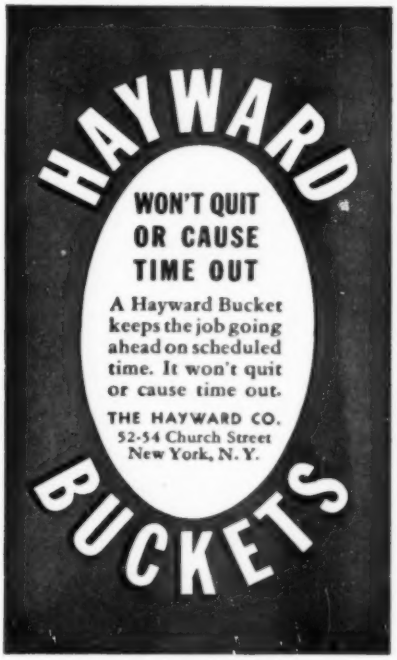
There is full shock-proof hydraulic control; also, finger touch power hydraulic steering at no extra cost. Creepage is denied during accurate, fine grading—no adjustments needed. The graders have large front wheels with front and rear interchangeable.

Shovel-Crane

Manufacturer: Schield Bantam Co., Waverly, Ia.

Claims: A new, heavy-duty truck-mounted shovel-crane provides 20% more lifting capacity than previous models. Conservatively rated at six tons capacity, the new ⅜-yd. heavy-duty Model T-35 is already in full

Continued on page 64


HAYWARD
WON'T QUIT OR CAUSE TIME OUT
A Hayward Bucket keeps the job going ahead on scheduled time. It won't quit or cause time out.
THE HAYWARD CO.
52-54 Church Street
New York, N. Y.
BUCKETS

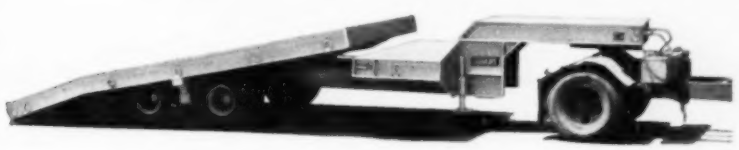
1. A rugged, balanced deck with beveled rear end to facilitate loading.
2. Two (2) hydraulic rams to cushion movement of the deck up or down.
3. A forward sub-deck to provide extra load capacity and stabilize the trailer by carrying part of the load on the truck-tractor.
4. Legs to support the front end when the trailer is not in use.
5. A substantial gooseneck with conventional fifth wheel which also provides extra space to carry a dipper or other equipment.

OTHER ROGERS TILT-DECK TRAILERS...

Write for the TILT-DECK TRAILER LITERATURE

EXPERIENCE builds 'em — PERFORMANCE sells 'em

ROGERS BROS. CORP.
ALBION, PENNA. CABLE: BROSITES



Divided bed, tilt deck trailer with gooseneck.

Export Office: 50 Church St., New York 7, N. Y., U. S. A. Cable Address: Brosites

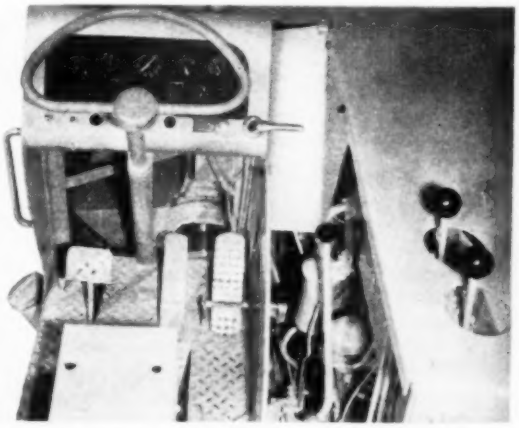
ALLIS-CHALMERS *MOTOR SCRAPERS*

FULL CONTROL makes

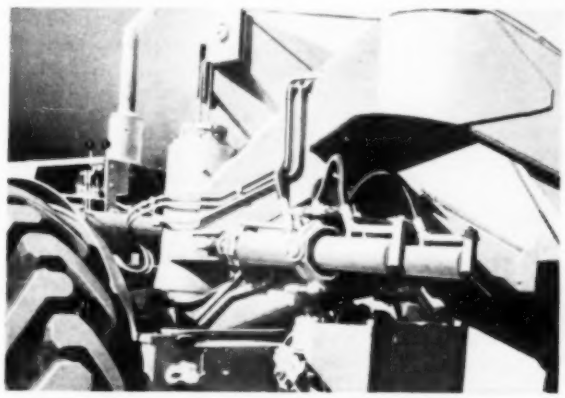
TS-300 IN ACTION
14 cu. yd. struck capacity
18 cu. yd. heaped capacity
280 hp. Buda diesel or
275 hp. Cummins diesel

the difference

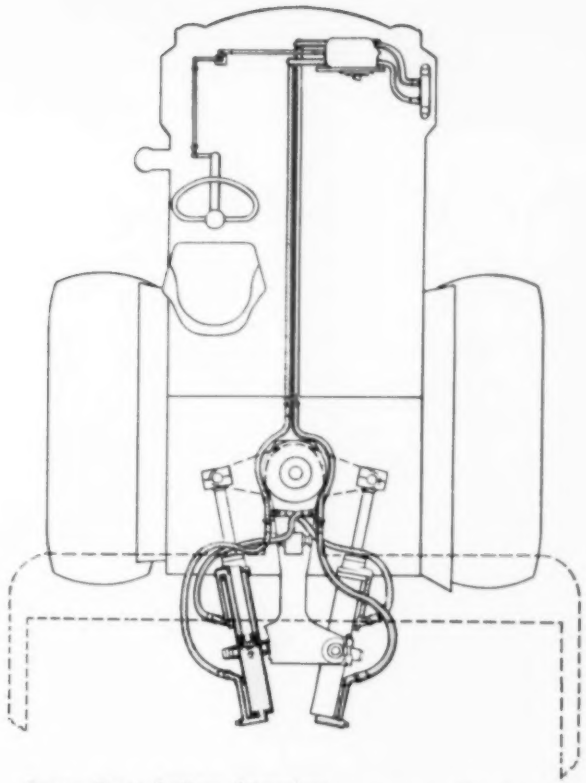
The full control built into Allis-Chalmers *Motor Scrapers* offers you a real advantage. There's no tiring wheel fight for the operator . . . no straining to see what he's doing. What's more, full control creates greater confidence when he's high-balling a full load. He can work at his best all day long easily and safely. To you owners, that means moving *more* dirt *faster*, more *profitably*.



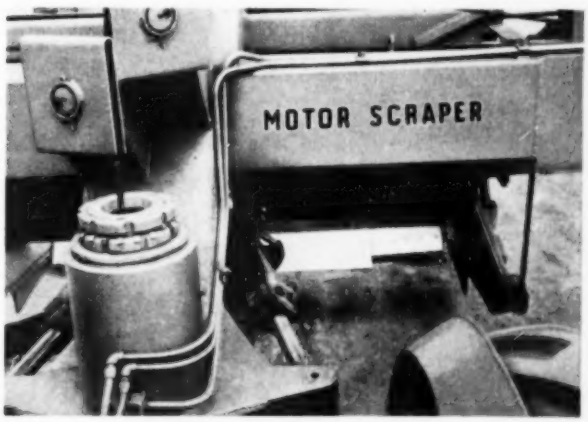
One Hand Does the Steering—the other handles the scraper controls. Fast action makes loading easy. The operator can utilize hydraulic power of steering jacks to pull through soft spots in haulways under extreme conditions.



No Weaving—No Road Shock — Hydraulic system is locked and the *Motor Scraper* becomes a rigid 4-wheel unit except when steering wheel is turned, thus eliminating transmission of road shock to steering wheel. Low-mounted rams, close to load line pull, mean minimum stress on the kingpin.



Easy, Fast-Action Steering — Schematic layout shows simple double-action steering system. Slightest movement of wheel opens valve of gear-type pump; release wheel and valve automatically returns to "hold." Only a one-third turn of steering wheel is necessary for a full swing of the tractor.



Excellent Operator Visibility — Clean design of low gooseneck connection gives operator unequalled view of cutting edge, helps him cut cleanly, efficiently . . . load fast and full.

Your nearby Allis-Chalmers dealer will be glad to show you and give you the full story on these job-proved *Motor Scrapers*. See them at work.

ALLIS-CHALMERS
TRACTOR DIVISION — MILWAUKEE 1, U. S. A.

New Equipment . . .

Continued from page 61

production with a complete line of matching attachments including shovel, clamshell, dragline, hook boom, magnet, wood grapple, and pile driver.

Major improvements over previous Model M-40 include: a stronger main frame with 54% increase in section modulus; larger shafts and bearings throughout; bigger diameter center pin; newly designed trunnion base with wider trunnion rollers and the use of four adjustable cam-type boom rollers instead of three. The T-35's vertical swing shaft bearing allows for almost twice as much radial load on the shaft, compared to the M-40 model.

The new Model T-35 offers more efficient performance because of substantial increases in both clutch and braking surfaces. Drum clutch surface in the T-35 has been increased 16.3%; swing clutch surface increased 42.5%, resulting in smoother, faster clutching action.

A 39.5% increase in drum braking surface plus 13.1 additional horsepower braking surface in the Model T-35 provide extra safety and better load handling accuracy.

The drum brake control on the new T-35 has been made easier for the operator, with a 24 to 1 ratio from pedal to brake band as compared with the 12.6 to 1 ratio on the Model M-40. Mechanical control levers are also reported to be more conveniently located to permit simultaneous control of swing and other operations, thus reducing operator fatigue.

Streamlining of the new Model T-35 hook unit has resulted in 12 ft-lbs more operator stability for outhaul and. A hinged metal door on top of the operator's cab can be opened to increase visibility for crane and Safety glass is standard equipment in the T-35 cab.

The full revolving Model T-35 incorporates other advanced construction features: anti-friction bearings on chine-cut gears; internal expanding band type clutches with molded friction linings and positive mechanical rollers; internal contracting brake band type swing brake for locking hook unit in desired position. Jackknife operated outrigger which can be used either for outhaul or swing control operation or for a power operated shovel dipper stick.

The new heavy duty model can be mounted on any one of seven tracking units from a shortened 15 ft. to 30 ft. Outside jacks with pads can also be used when ground conditions are favorable.

Truck Lift Truck

[illegible]

Air Hoist

[illegible]

Excavating

[illegible]

coupled position which permits full flow of fluids. Pressing the lock lever separates the coupling halves and starts the disconnecting action which is completed by a light pull.

When fully disconnected, each half of the coupling forms a perfect seal. Reconnection of the two halves is quick and positive, and may be accomplished without actuating the lock lever.

The couplings may be used with a wide range of fluids such as hydraulics, water, hot oil, crude and fuel oils, antifreeze solutions, gasoline, Diesel fuels, air, and others. Their uses include many applications such as engine test stands, drilling rigs, farm loaders, pneumatic gun charging systems, air tools, and others.

New Truck Line

Manufacturer: Mack Trucks Inc., 550 Fifth Ave., New York 1, N. Y.

Claims: The manufacturer has introduced a completely new truck line. Designated the B Series Macks, the new line includes both trucks and tractors in four and six-wheel types, covering a range from 17,000 lbs. GVW through 70,000 lbs. GCW, powered by gasoline or Diesel engines.

The B Series is entirely new in design and engineering from tail light to front bumper to meet and anticipate the most modern operating requirements.

Typical of the advantages claimed for the B Series is that of highest possible payload capacity, both of volume and weight, within legal limitations.

Demountable Cab

Manufacturer: Autocar Co., Ardmore, Pa.

Claims: An all-steel, quick demountable cab, removable in less than 10 minutes for major engine maintenance and repairs, has been brought out for the manufacturer's engine-under-seat trucks and highway tractors.

Hold-down bolts are easily accessible. Wiring can be disconnected at plugs, pipes at unions. Brake and accelerator pedals are mounted permanently on the floorboard which remains in place as part of the chassis. Water connections do not have to be disturbed.

While a two-man team of expert mechanics racing against time performed 16 required operations on either side of the cab and had it off in six minutes and 35 seconds, average time is about 10 minutes, according to the manufacturer. Good replacement time, the company added, is 15 to 20 minutes. Removal of the cab was required only for major repair of the engine. The engine can be reached for minor work by raising the seat backs and removing the seat cushions.

Other cab design improvements include the positioning of the seat so that the driver is brought four inches closer to the windshield where he has an enlarged view of the highway. The seat cushion, with double-deck springs, has fore and aft vertical adjustments. The seat back has also been made adjustable.

An entirely new instrument panel provides improved grouping of instruments and controls. The panel can be swung back on hinges exposing the wiring, fuses and connections for inspection and repair. The new cab construction makes possible the use of conventional type engines with downdraft carburetion and belt-driven generator.

The cab roof is two inches higher than on previous models. Outside overall length of the quick-demountable cab is 73 inches, outside overall width is 64 inches, inside maximum width, 59 inches; top of seat cushion to roof, 37½ inches; width of seat, 50 inches.

WELLMAN *Williams Type*

FAST BUCKET OPENING SPEEDS OPERATIONS

• Double-hinge construction on Wellman's multiple-rope bucket permits faster opening than a single hinge. This speeds up operations, also gives a bigger spread in the open bucket for the same headroom.

Wellman's welded-design buckets offer you better performance and longer service. In all types and sizes you'll do better with Wellman!

Want Facts?

Write for free descriptive bulletins.

CLAMSHELL • DRAGLINE
CUSTOM-BUILT BUCKETS
STONE AND WOOD GRABS

THE WELLMAN ENGINEERING COMPANY
7000 Central Avenue
Cleveland 4, Ohio

New Equipment . . .

Continued from page 61

production, with a complete line of matching attachments, including shovel, clamshell, dragline, back hoe, magnet, wood grapple, and pile driver.

Major improvements over previous Model M-49 include: a stronger main frame with 54% increase in section modulus; larger shafts and bearings throughout; bigger diameter center pin; newly designed trunnion base with wider trunnion rollers and the use of four adjustable cam-type hook rollers instead of three. The T-35's vertical swing shaft bearing allows for almost twice as much radial load on the shaft, compared to the M-49 model.

The new Model T-35 offers more efficient performance because of substantial increases in both clutch and braking surfaces. Drum clutch surface in the T-35 has been increased 36.3%, swing clutch surface increased 45.5%, resulting in smoother, faster clutching action.

A 39.3% increase in drum braking surface plus 13.1 additional boom hoist braking surface in the Model T-35 provide extra safety and better load handling accuracy.

The drum-brake control on the new T-35 has been made easier for the operator, with a 21-to-1 ratio from pedal to brake band, as compared with the 13.6-to-1 ratio on the Model M-49. Mechanical control levers are also reported to be more conveniently located to permit simultaneous control of swing and other operations, thus reducing operator fatigue.

Streamlining of the new Model T-35 basic unit cab has resulted in 37.8% more operator visibility for ordinary work. A hinged metal door on top of the operator's cab can be opened to increase visibility for crane work. Safety glass is standard equipment in the T-35 cab.

The full-revolving Model T-35 incorporates other advanced engineering features; anti-friction bearings, machine-cut gears, internal expanding band type clutches with molded linings and positive "snap-in" rollers, external contracting brakes, band-type swing brake for locking basic unit in desired position, jackshaft-mounted tagline which can be used either for ordinary tagline operation or for a power-operated shovel dipper trip.

The new, heavy-duty model can be mounted on any new or used tandem axle truck having a wheelbase of 164 inches or more. Suitable single axle trucks can also be used when ground conditions are favorable.

Fork Lift Truck

Manufacturer: Hyster Co., 2902 N. E. Clackamas, Portland 8, Ore.

Claims: Two completely new fork lift truck models have just been released to industry. They are an 8,000-lb. capacity truck and a 6,000-lb. capacity model. Both are gasoline-engine powered and mounted on pneumatic tires.

Designed as an ideal "outside" truck, the ZA-80 heavy-duty 8,000-lb. industrial truck can be operated efficiently indoors as well as out. Special attention was given to operator comfort, ease of daily servicing and safety. Other features are shorter over-all length, longer wheelbase and better weight distribution than usually found in a truck of this size.

The XA-60 model is a 6,000-lb. capacity version of the ZA-80 incorporating all the rugged heavy-duty features of the larger truck, but with shorter wheelbase, width and over-all length. The smallest and heaviest 6,000-lb. capacity truck ever designed, the XA-60 is distinguished by its compactness, maneuverability and versatility on the job.

Among the new mechanical features of both trucks are a longlife clutch that can be completely removed or installed in less than an hour, and large heavy-duty disc-type industrial brakes that eliminate many service and maintenance problems. In addition, both use powerful industrial engines designed especially for the grueling work lift trucks are subjected to. Both trucks were thoroughly tested for two years in industry under actual field conditions before being released.

"Gosh, Bill — I'm sorry! I didn't know the gun was loaded!"

Air Hose

Manufacturer: B. F. Goodrich Co., Akron, O.

Claims: A new heavy duty air hose, suitable for working pressures up to 400 pounds psi, is called "Commander." The hose is reinforced with a single braid of high tensile steel wire and is said to be more flexible than other types of heavy duty air hose.

According to the manufacturer, Commander air hose is designed for rugged service in mines, quarries, construction projects, and general industrial use where high working pressures are required or where the hose cover is subjected to severe abrasion. Commander is manufactured in one-half, three-quarters, and one-inch sizes.

Coupling

Manufacturer: Aeroquip Corp., Jackson, Mich.

Claims: A new Slide Seal Coupling permits instant connection and disconnection of fluid-carrying lines by means of a simple push-pull action. Motion is similar to that used when inserting and removing a plug from an electrical outlet.

Consisting of two simple 2-piece die-cast aluminum assemblies with rubber "O" rings, the Slide Seal Coupling is lightweight, compact, and low in cost. A spring actuated locking device holds each half of the coupling in the

coupled position which permits full flow of fluids. Pressing the lock lever separates the coupling halves and starts the disconnecting action which is completed by a light pull.

When fully disconnected, each half of the coupling forms a perfect seal. Reconnection of the two halves is quick and positive, and may be accomplished without actuating the lock lever.

The couplings may be used with a wide range of fluids such as hydraulics, water, hot oil, crude and fuel oils, antifreeze solutions, gasoline, Diesel fuels, air, and others. Their uses include many applications such as engine test stands, drilling rigs, farm loaders, pneumatic gun charging systems, air tools, and others.

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CLAMSHELL • DRAGLINE
CUSTOM-BUILT BUCKETS
STONE AND WOOD GRABS

THE WELLMAN ENGINEERING COMPANY
7000 Central Avenue
Cleveland 4, Ohio

New trade literature

Subject: **Jaw Crushers**
Content: Bulletin No. 600 gives six pages of facts and specifications on the 11 sizes of Diamond jaw crushers. The bulletin contains cut-away views of the jaw crushers and several useful charts. Included in the charts are: Capacity table in tons per hour of the 11 crushers; toughness of various kinds of rock; and a chart that tells the percentage of stone crushed and retained at any crusher setting. Bulletin No. 1000 gives specifications on the new 100 Series of three portable single pass gravel plants. The bulletin also highlights the plants' outstanding features and illustrates Model No. 124 portable crushing plant. Both bulletins are in color.
Where to get: Oscar E. Olson, Diamond Iron Works, Inc., 1748 N. Second St., Minneapolis, Minn.

Subject: **Chains, Sprockets**
Content: A new bulletin on Baldwin-Rex roller chains and sprockets has just been published. The 54-page book describes advantages of roller chain, and illustrates all popular sizes. A section of the bulletin tells "how to select standard roller chain drives" with formulas, tables, and examples illustrating procedure. Roller chain dimensions, strengths, weights, and prices are included. A section of the bulletin deals with stock sprockets their characteristics and prices. Bore, keyway, and set-screw information is presented. Proper maintenance of chain drives is reviewed, and important information on chain vises, flexible couplings, and coupling covers is provided.
Where to get: Baldwin-Duckworth, Division of Chain Belt Co., Dept. P.R., Springfield 2, Mass. (Bulletin No. 52-1)

Subject: **Prestressed Concrete**
Content: Catalog T-920 reviews Roebling's new line of prestressing materials; prestressed concrete wire and strand for pre-tensioning . . . strand and fittings for post-tensioning. The 14-page catalog shows that wire and strand for pre-tensioning are made of high tensile steel that results in products of high elastic characteristics. In addition, all wire and the SR grade strand are processed in such a way that their bonding quality is greatly increased. The basic unit of the manufacturer's prestressed concrete strand is hot-galvanized acid steel wire. Charts, diagrams, and illustrations are included in the catalog.
Where to get: John A. Roebling's Sons Corp., Trenton 2, N. J.

Subject: **Blasting**
Content: A new 28-page booklet, printed in Spanish for the benefit of South and Central American mine, quarry, and construction engineers, explains in detail the millisecond delay or Rockmaster system of blasting. Dominating the more than 50 illustrations are many sequence photographs of actual blasts captured with the company's automatic cameras which show development of a blast and the progression of rock movement. Each blast pictured is detailed as to nature of the rock, placement of holes, type of charge used, and the delay factor inherent in the blasting caps selected. Photographs show how operators, with charges fired at the bottom of the holes, can achieve initial movement at the toe, virtually no premature escape of gases, sharply reduced vibration and noise, and improved thoroughness of break-up. Sketches show 21 variations of millisecond delay blasting in underground mining, quarrying, and construction work, and apply these methods to typical situations. Copies of *Sistema de Voladura Rockmaster 16* are available on request.
Where to get: Explosives Department, Atlas Powder Co., Wilmington 99, Del.

Subject: **Scraper Models**
Content: A new three-color 12-page illustrated catalog covers the line of seven modern pull-type scrapers now available through Allis-Chalmers dealers. Detail views of each of the four units produced at the Cedar Rapids Works are shown, with those of three Gar Wood scrapers. They provide a selection of pull-type earth-moving equipment with struck capacities ranging from two to 18 cubic yards, for use with all size crawler tractors in the field today. The catalog also includes complete specifications and other pertinent data on each of seven units.
Where to Get: Allis-Chalmers Manufacturing Co., Tractor Division, Milwaukee, Wis.

Subject: **Rock Bits**
Content: Rock-drill bits are listed and described in a new 24-page booklet. Tungsten-carbide rock-bits; carbide-insert intra-set drill steel; hollow drill steel; paving breaking — clay digging — and asphalt cutting tools; pneumatic star drills; chipping hammer tools are among the items. Descriptions of the products are amplified by tables of dimensions and weights. All products are illustrated.
Where to get: Brunner & Lay, Inc., 9300 King St., Franklin Park, Ill.

Subject: **Shovels**
Content: A new four-color catalog describing the Gar Wood Model 75A and 75B shovels and the 75BT truck crane has just been released. This new catalog describes in detail the workings of the fluid coupling which absorbs and cushions shocks. Other features described are the exclusive right angle gear drive which eliminates adjustments, is completely sealed in oil; power actuated hoist clutches; heavy duty conical rollers;

NEWCO* WIRE ROPE CLAMP & THIMBLE
*trade mark

. . . gives holding efficiency of 95 to 100%.
. . . will not collapse.
. . . no shearing of bolts.

BEARING SERVICE is many times heavier, for example, the 5/8" Newco has a 1/2" bearing surface! Carries a heavier load, and the original cost is easily absorbed by savings on labor and longer life. In 12 sizes

3/8" to 1" size STEEL CLAMPS (Approx. 80,000 PSI's)
1/8" to 5/16" MANGANESE BRONZE (Approx. 110,000 PSI's)

See your distributor or write direct to

NEWMAN MFG. & SALES CO.

Dept. EE-8, Box 3939, Kansas City 11, Mo.

Excavating Engineer Index Ready

Readers who want a free copy of the index to Volume XLVI (the twelve issues of 1952) may have one by writing to us. Send your request to EXCAVATING ENGINEER, South Milwaukee, Wisconsin.

and power steering. The new catalog also points out the ability of the 75's to hoist, swing and travel simultaneously. Independent chain crowd is mentioned as one of the features which reduces conversion time. The shovels have a ¾-yd. capacity in a standard and heavy duty class and the truck crane is rated at 20 tons.

Where to get: Gar Wood Industries, Wayne, Mich.

Subject: **Road Machinery**

Content: A new picture folder describing the Bros line of road machinery has just been released. The folder illustrates and describes Bros Pneumatic tire rollers and giant 50-ton "Roll-O-Pactors," drum-type tampers. "Bituminizer" distributors, "Spray-matic" spray bars, portable steam generators, and asphalt circulators. Ask for Folder No. RE-113.

Where to Get: Road Machinery Division, Wm. Bros Boiler & Mfg. Co., Minneapolis 14, Minn.

Subject: **Tractor-Loader**

Content: A new bulletin pictures the TL-10 Tarcto-Loader with its hydraulic torque converter drive and specially designed clutch-type transmission. Torque converter automatically adjusts forward travel against loading resistance. Speed and power is always balanced. The single lever control—for forward and reverse—is discussed in the new bulletin. Two multiple-disc clutches are built right into the transmission. Both are controlled by a single operating lever. Operator pushes lever to engage forward clutch, pulls it back for reverse. When lever is at center, both clutches are disengaged. Various attachments for the Tractor-Loader are illustrated. A specifications sheet is included on the back of the bulletin.

Where to Get: Tractomotive Corp., Deerfield, Ill.

Subject: **Wire Rope**

Content: *General Wire Rope Recommendations for Contractor's Equipment* is a new 20-page booklet intended to guide contractors in getting the most out of wire rope. The booklet is well illustrated. It contains an explanation of "Wire Rope Constructions" as well as a discussion of "Lang Lay vs. Regular Lay Rope," "Clamshell Buckets," and "Internal Lubrication." Each page presents an outline drawing to indicate the type of equipment and full recommendations are listed for each rope on the particular machine. The recommendations booklet is based upon more than 50 years of experience in manufacturing wire rope for the construction industry.

Where to get: Macwhyte Co., F. J. Nelson, Advertising Manager, Kenosha, Wis.

Subject: **Surveying**

Content: The seventh edition of *Higher Surveying*—Volume II of *Principles and Practices of Surveying* by Breed and Hosmer—was published in May by John Wiley & Sons. The book contains changes in all five major divisions. These include control of the survey, filling in topographic details, photogrammetric survey, hydrographic surveying and stream gaging, and constructing and finishing maps. Entirely rewritten, the chapter on barometric leveling emphasizes the latest developments in the use of surveying altimeters. The section on photogrammetric survey includes information on the newest methods and instruments for constructing maps from aerial photographs. Because of the new arrangement of the American Nautical Almanac, the discussion of astronomical observations has been revised to include text and examples illustrating the Greenwich Hour Angle Method. The treatments of the measurement of flow of water, finishing topographic maps, and aerial cameras and photo interpretations are among the other details that serve to bring the seventh edition into full accord with present practice. Charles B. Breed is professor emeritus of civil engineering at the Massachusetts Institute of Technology where the late George L. Hosmer was professor of geodesy. *Higher Surveying* contains 675 pages.

Where to get: John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y.

Subject: **Diesel Electric Sets**

Content: A detailed description of five Caterpillar Diesel electric sets is contained in a new booklet published by the manufacturer. The booklet, with 50 illustrations, points up the ability and economy of these five models — D17000, D13000, D8800, D318, D315, and D311. One of the features of the publication is two cutaway views of a D13000 Diesel electric set. The booklet describes in detail the fuel, lubrication, and cooling systems of the units; points out the advantages of several of the important parts that go into the electric sets; contains descriptions of both self-regulated generators and the completely auto-

Move More Rock Quickly, SAFELY

with easy pickups Bucyrus-Erie rock grabs handle rock easily and quickly, without dog holes or sling. Since these grabs are self-attaching, only two men are needed for the operation — one at the crane levers, the other guiding.

with no-slip grabs Multiple-part rope hitch creates powerful jaw compression that increases in proportion to the load. The heavier the load, the tighter they hold.

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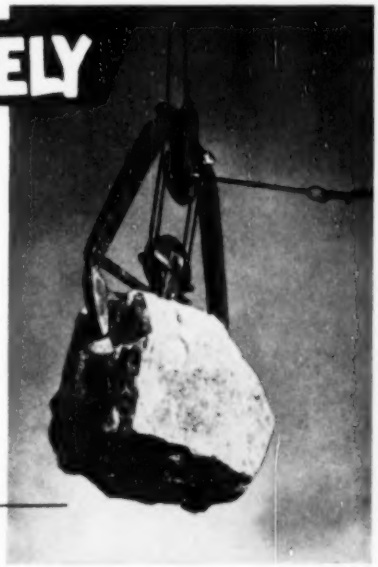


Bucyrus-Erie rock grabs are available in five sizes — range from 2½- to 20-ton capacity.

WRITE FOR FULL INFORMATION.

BUCYRUS ERIE

SOUTH MILWAUKEE WISCONSIN

matic standby electric sets, describes the many attachments for the units, and gives complete specifications on all five models. Diesel electric sets. (Form 30507) is available on request.

Where to get: Caterpillar Tractor Co., Peoria, Ill.

Subject: **Steel Sheet Piling**

Content: In addition to giving comparative information on steel sheet piling manufactured by major steel companies, a new catalog also cites the advantages of renting piling. To help the contractor in estimating a job, one section lists the number of piles required for various wall lengths. Included also in the 20-page 8½ x 11 in. catalog are piling data related to circular and diaphragm-type cellular cofferdams, circular cofferdams, Z-piling and other connections, corner pieces, and specifications for piling sections. Pile extractors and pile hammers also are discussed. Copies of the new catalog, designated as No. 575 D, are available upon request.

Where to get: L. B. Foster Co. offices: P. O. Box 1647, Pittsburgh 30, Pa.; 11 Park Place, New York 7, N. Y.; 231 S. LaSalle St., Chicago 4, Ill.; and 914 Main St., Houston 2, Tex.

Subject: **Diesel Engines**

Content: A new 48-page booklet gives detailed descriptions of what engineering design features to look for in Diesel engines. Ratings and descriptions of Murphy Diesel models are presented. Nineteen pages of photographs of typical installations are also shown.

Where to get: Murphy Diesel Co., 5317 W. Burnham St., Milwaukee 14, Wis.

Subject: **Electric Shovel**

Content: A new bulletin describes the Marion 111-M Ward-Leonard Electric shovel. The unit carries a standard 4-yd. dipper or bucket, and is featured as shovel, dragline, clamshell, crane, and coal loader. As dragline, the bucket capacity varies from 3-4½ cubic yards, depending on the length of boom. Its rated crane capacity is 165 tons. The 12-page, two-color booklet contains illustrations of the unit in many material handling applications. Some of the 111-M features are: Fast cycle time with responsive power without fear of overloading; improved 600 line motors; quality machining where it counts; deep welded construction for upper and lower frames; and operating stability. Ask for Bulletin No. 408.

Where to get: Marion Power Shovel Co., Marion, O.

Subject: **15.5-yd. Scraper**

Content: Details of the new "lever action" 15.5-yd. scraper, having vertically mounted jacks actuating levers which independently control the bowl, apron, and ejector, is presented in a 16-page catalog folder. The new scraper design eliminates all cable, with the exception of a short length used to open the apron, and incorporates a simplified hydraulic system having a heavy duty pump mounted internally in the supply tank. All four hydraulic jacks are interchangeable and the cutting edge has been designed in four sections, each blade being interchangeable and reversible and may be set to various degrees and patterns of overhang for loading in various soil conditions.

Where to get: Euclid Road Machinery Co., Cleveland 17, O.

Subject: **Paving Breakers**

Content: A new piece of literature tells the story of Ingersoll-Rand's series of paving breakers from the 14-lb. J-10 to the 146-lb. R-30. Each machine is adequately described both as to specifications and jobs it can perform. A typical cross-section view shows all the important features of the construction and design of the paving breaker line. Individual pictures of each help to emphasize the *Right Breaker for Every Job* theme of the bulletin. In addition, two pages of the eight-page bulletin il-

UNITED PRESS PHOTO

BUILDING WITH EXPLOSIVES

Hoover Dam is an outstanding example of the many large construction projects which Hercules explosives have helped to build. The use of explosives on such projects calls for thorough understanding of the rock formation, selection of the correct explosives to shoot the rock, and adequate facilities to supply explosives on schedule. Our Contractors Division has complete technical and cost data on the use of explosives in any type of construction. Hercules also has service facilities to help you in solving mining, quarrying, and petroleum problems involving explosives.

HERCULES POWDER COMPANY

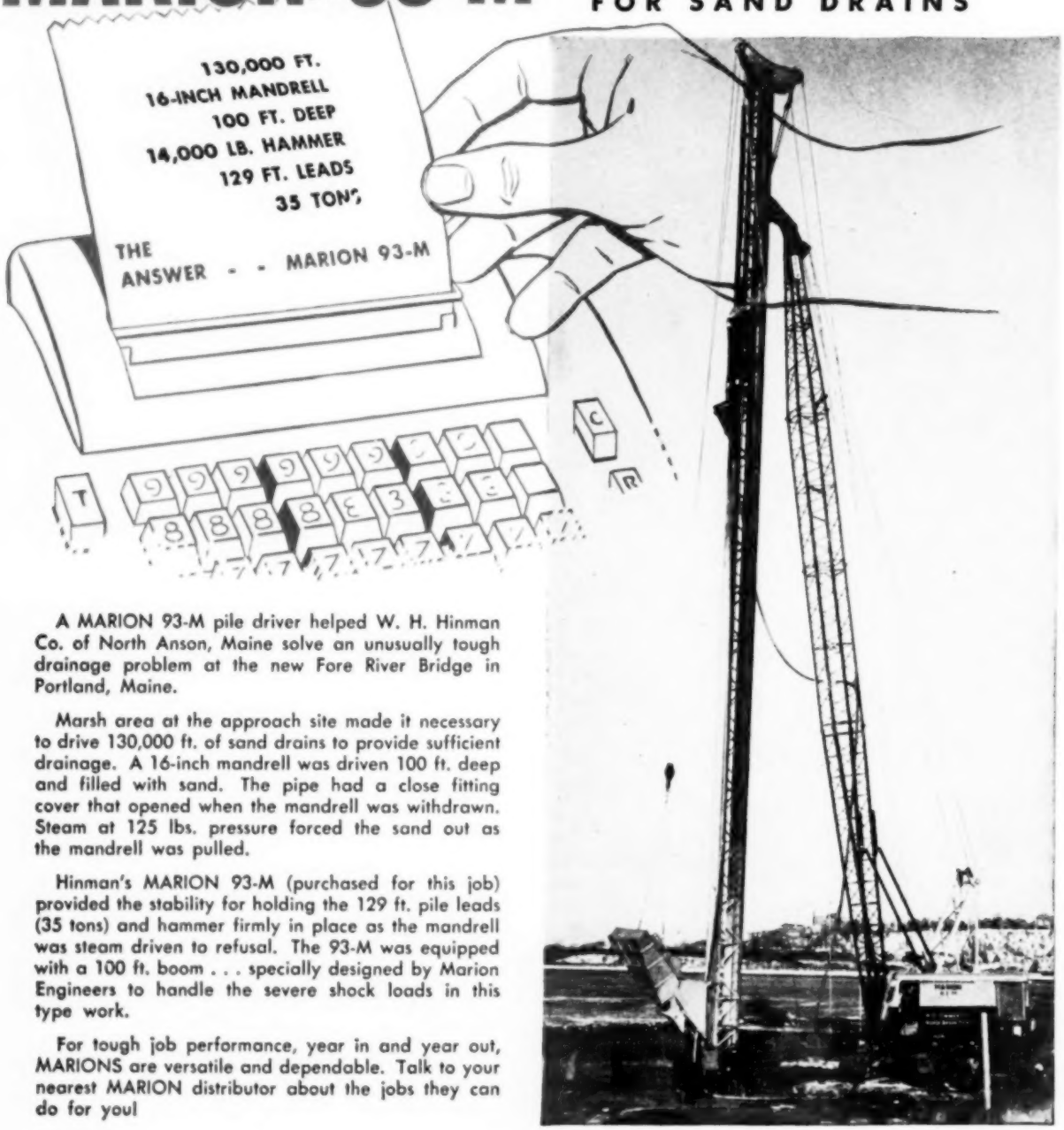
Explosives Department, 972 King Street, Wilmington 99, Delaware

Birmingham, Ala.; Chicago, Ill.; Duluth, Minn.; Hazleton, Pa.; Joplin, Mo.; Los Angeles, Cal.; New York, N. Y.; Pittsburgh, Pa.; Salt Lake City, Utah; San Francisco, Cal.

XR53-3

The Right Answer for a Marsh Drainage Problem in Maine

MARION 93-M as a pile driver
FOR SAND DRAINS



A MARION 93-M pile driver helped W. H. Hinman Co. of North Anson, Maine solve an unusually tough drainage problem at the new Fore River Bridge in Portland, Maine.

Marsh area at the approach site made it necessary to drive 130,000 ft. of sand drains to provide sufficient drainage. A 16-inch mandrell was driven 100 ft. deep and filled with sand. The pipe had a close fitting cover that opened when the mandrell was withdrawn. Steam at 125 lbs. pressure forced the sand out as the mandrell was pulled.

Hinman's MARION 93-M (purchased for this job) provided the stability for holding the 129 ft. pile leads (35 tons) and hammer firmly in place as the mandrell was steam driven to refusal. The 93-M was equipped with a 100 ft. boom . . . specially designed by Marion Engineers to handle the severe shock loads in this type work.

For tough job performance, year in and year out, MARIONS are versatile and dependable. Talk to your nearest MARION distributor about the jobs they can do for you!

MARION POWER SHOVEL CO.
MARION, OHIO, U. S. A.

OFFICES AND WAREHOUSES IN ALL PRINCIPAL CITIES

from 3/4 cu. yd. to 45 cu. yds.

lustrate the individual tools and accessories available for the complete line. Request form 4127.

Where to get: Ingersoll-Rand Co., Department RD, 11 Broadway, New York 4, N. Y.

Subject: **Acco Sling**

Content: A four-page folder describes a new ACCO Registered Wire Rope Sling, the SW-55. Attractively illustrated in three colors, folder DH-421 describes the merits of the proof-tested SW-55 sling: Shows the type lifts it will handle efficiently; has complete specifications, dimensions, and recommended uses. For further information on the SW-55, request the DH-421 folder.

Where to get: American Chain & Cable Co., Inc., Wire Rope Sling Dept., Bridgeport 2, Conn.

Subject: **Dump Body Business**

Content: The first issue of a new magazine *Dump Body Business* was published in January. The new publication is designed to fill the need for specialized news coverage of the dump body and hoist field. Published on an every-other-month schedule, *Dump Body Business* is being circulated to truck dealers, contractors, and others interested in dump bodies.

Where to get: Marion Metal Products Co., Marion, O.

Subject: **Crawler Tractors**

Content: Presentation of four Diesel-powered crawler tractors is made in a unique way with a new catalog which shows details of construction of each model with full cutaway pictures, and the variety of applications of each on the job. As the pages are turned, a spread of the cross-sectional views with the job application illustrations is found for each model. When completely opened, the four tractors in cross section are on view. The back then becomes mainly pictorial. To set the pace for the catalog, a "frame" is die-cut in the lower right corner of the first page to provide a three-dimension effect.

Where to get: Allis-Chalmers Manufacturing Co., Tractor Division, Milwaukee 1, Wis.

Subject: **HT4 Shovel**

Content: A new bulletin describes and pictures the HT4 shovel, a heavy-duty digging tool. The HT4 loads material directly into trucks and railroad cars, it backfills, grades, and carries everything from dirt and sand to logs. Struck bucket capacity of the HT4 is one cubic yard and heaped capacity is 1¼ cubic yards. Dumping height is 9-ft. 6-in. Overall dimensions are: Maximum height, bucket raised is 12-ft. 2-in.; minimum height, bucket lowered is six feet; unit length is 14-ft. 2-in.; and width is 6-ft. 8-in. A Caterpillar 43 hp Diesel engine powers the HT4. A low center of gravity and the long, wide base provided by wide gauge extra long tracks give the machine extra stability.

Where to get: Caterpillar Tractor Co., Peoria, Ill.

Subject: **Wire Fittings**

Content: A new six-page brochure contains blueprint drawings, tables, and ordering information on open and double wedge sockets, pins, and continuous cable clamps. The brochure also shows pictures of the fittings in various field work and tells of other applications.

Where to get: Sauerman Bros., Inc., Dept. E-33, 522 S. Clinton St., Chicago 7, Ill.

Subject: **Testing Apparatus**

Content: A new catalog treats of apparatus for engineering tests of soils, asphalt, concrete, and materials. The catalog has 72 pages and is fully illustrated. Content classifications are: Soils — General — Concrete —Bituminous Testing.

Where to get: Soiltest, Inc., 4520 W. North Ave., Chicago 39, Ill.

Subject: **Motor Standards**

Content: A new bulletin containing complete information on the new NEMA motor standards is now available. The standards, passed by NEMA on May 19, set up new frame dimensions for a-c motors from 1 to 30 hp. Designated as GEA-5995, the eight-page two-color publication compares the old with the new frame assignments for open-type poly-phase, single-phase, and wound rotor motors as well as totally-enclosed fan-cooled types. Also listed are the suggested new frame assignments for foot-mounted and flange-mounted motors, and standards for minimum locked-rotor torque for general purpose single-phase motors.

Where to get: General Electric Co., Schenectady 5, N. Y.

Subject: **Safe Work Habits**

Content: *Working Together for Safety* is the title of the National Safety Council's new 32-page employee rules manual. Safe practices in fire prevention, tool handling, machine operation, protective clothing, etc., are covered. Free sample copy.

Where to get: National Safety council, 425 North Michigan Ave., Chicago 11, Ill.

"The radio, heater, spotlights, tissue dispenser, awning and such I didn't object to — but *this* is too much."

NOT in the Contract

A woman went to a doctor to complain about her husband's odd obsession.

"It's terrible, Doctor," she wailed. "All the time he thinks he's an ice box."

"Well," consoled the medical man, "that isn't too bad. Quite a harmless delusion, I'd say."

"The delusion I don't mind, Doctor," said the woman, "but when he sleeps with his mouth open—the little light keeps me awake!"

Bar Fly: "Is there a doctor in the house?"

Bartender: "Why do you want a doctor?"

Bar Fly: "I want him to buy me a drink. I stayed home from work today and when I go back I want to be able to tell the boss I was treated by a doctor."

The chorus girl swept into the dressing room with a mink coat draped casually over her arm.

"Dearie," asked one of the other girls, "how did you ever get such a gorgeous mink? Why, I've been struggling for years to get one."

"Honey," replied the other, "you musn't struggle . . . ever."

"I found a bottle of rye and a bottle of ginger ale in your desk . . . what do you make of it?"

"Highballs."

A man who was an ardent baseball fan finally agreed to take his wife to the big league park to see a game. She knew nothing about the game but during the afternoon she became interested and asked her husband:

"Why do they always take the pitcher his sweater when he gets to first base?"

"To keep him from catching cold," replied her husband.

"Oh," said the wife, "is it colder on first base?"

A window washer related this experience to his friends: "One day I was cleaning a bathroom window when a young woman entered and started to undress. She took off her shoes and stockings and then her dress, and just when she was about to take off her bra and panties the ladder broke."

"What a calamity at a time like that," remarked one of his listeners.

"It sure was," answered the window cleaner, "but what could you expect with 20 guys on the ladder?"

"I see he's down to bed rock."

It is reported that a Communist Party worker, having a particularly tough time finding recruits in America, submitted the following report to his superior:

"It is becoming increasingly difficult to reach the downtrodden masses in America. In the spring they're forever polishing their cars; in the summer they take vacations; in the fall they go to the world series and football games. And in the winter you can't get them away from their television sets. Please give me suggestions on how to let them know how oppressed they are."

"Why did you tear out the back part of that new book?" asked the long suffering wife of the absent-minded doctor.

"Excuse me, dear," said the famous surgeon, "the part you speak of was labeled 'Appendix,' and I took it out without thinking."

City Clerk: "What do you want to change on this death certificate?"

Doctor: "I signed my name in the space marked 'cause of death.' "

Stranger: "I came in because I read your ad for a man to retail canaries."

Proprietor: "Oh, do you want the job?"

Stranger: "Well, no. But I'm sure curious—how did the canaries lose their tails?"

The doctor gave his 80-year-old patient a very curious look.

"I've been practicing for two decades, and I'm darned if I ever heard of such a complaint as yours. What do you mean, your virility's too high?"

"It's all up in my head," replied the old man, sighing gently.

"That chair," a businessman told a visitor, "cost $5,000."

"Say you!" replied the visitor. "How could a chair like that be worth $5,000?"

"That's what it cost me last year," the businessman explained. "Sitting in it and thinking, instead of going out after business."

"This model has a top speed of 130 miles an hour, and she'll stop on a dime."

"What happens after that?"

"A little putty knife comes out and scrapes you off the windshield."

"We're sold on Caterpillar equipment. We have never found anything better!"

W. Galbraith, Superintendent, C. L. Hubner Co., Denver, Colorado

Performance is Mr. Galbraith's yardstick. Superintendent of Hubner's portable rock-crushing plant near Stratton, Nebraska, he knows from experience that Caterpillar equipment pays off. On this job, a D17000 Engine powers a Pioneer crusher—a D13000, the Lima 1½-yard shovel. A D6 Tractor with No. 6S Bulldozer also contributes to profitable production.

The plant has a capacity of from 300 to 400 tons per hour. The shovel works 8-10 hours a day, 25 days a month, all year round. The crusher has a 10-hour daily schedule, 25 days a month, 8 months a year. At the time this picture was taken, its D17000 had been working 13,365 hours. That's good, but not unusual—many Cat* Diesels are still going strong after 80,000 hours.

Long life is just one of many reasons it pays you to standardize on big yellow units. Built for trouble-free operation, they use low-cost No. 2 furnace oil *without fouling*. Complete engine sealing, along with fuel and oil filters, keeps them working with a minimum of down time under the dustiest conditions. If they need fixing, your call brings fast, on-the-spot service from your Caterpillar Dealer—*one* source for *all* service!

Next time you order replacement power or new machinery, specify Cat power. More than 150 manufacturers can supply these durable engines in their equipment. For proof of performance, see your dealer. Ask him to *show* you how they can cut your costs and increase your profits!

Caterpillar Tractor Co., Peoria, Illinois.

CATERPILLAR*

*Both Cat and Caterpillar are registered trademarks—®

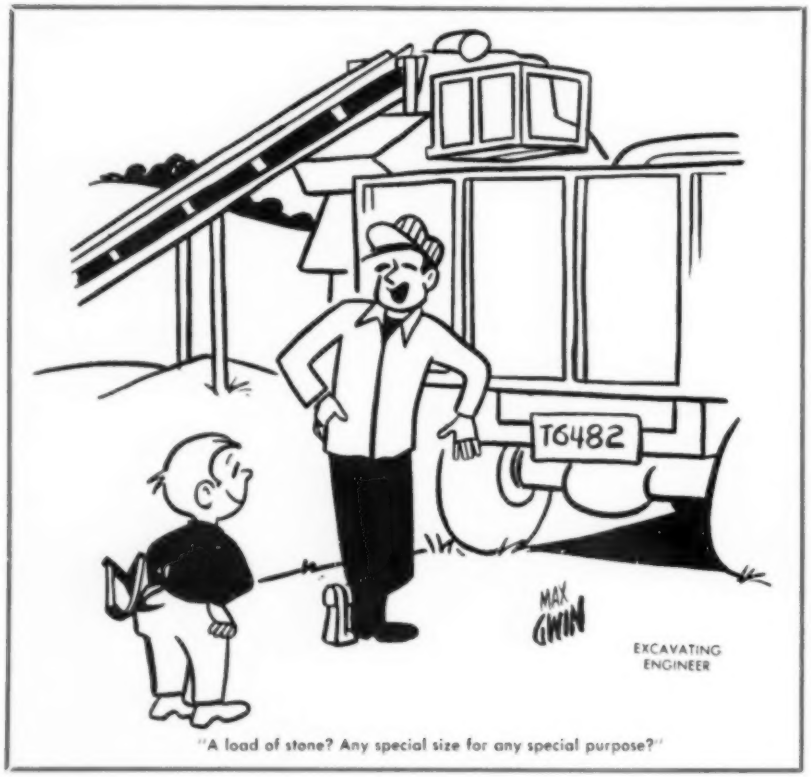
SPECIFY CAT POWER FOR HIGH-PROFIT PRODUCTION

Notes from the manufacturers

American Brake Shoe Co., American Manganese Steel Div., New York, N. Y., has appointed John Brandenburg central sales manager. A graduate of Yale, Brandenburg joined the company in 1930 as an apprentice and advanced through various production positions to plant superintendent. In 1934 he transferred to the Amsco sales department representing the export division and brake shoe and castings division. Brandenburg will be located in Chicago Heights.

Bridgeport Chain & Mfg. Co., Bridgeport, Conn., has changed its name to The Round Bridgeport Chain & Mfg. Co. Bridgeport Chain, for many years, has been associated with Round Chain Companies, a coast-to-coast group of 11 companies. The name change is in keeping with a policy to identify individual companies more closely as members of the Round Chain group. Other companies in the group are: Round Woodhouse Chain & Mfg. Co., Trenton 7, N. J.; The Cleveland Chain & Mfg. Co., Round Metal Finishing Co., and Ohio Hoist & Mfg. Co., Cleveland 5, O.; The Round Chain & Mfg. Co., Chicago 38, Ill.; The Southern Chain & Mfg. Co., Birmingham 4, Ala.; Round Alloys Mfg. Co., Trenton 7, N. J.; Round California Chain Co., So. San Francisco, Calif.; Round Los Angeles Chain Corp., Los Angeles, Calif.; Round Seattle Chain Corp., Seattle 8, Wash.; and Portland 10, Ore.

Bucyrus-Erie Co., South Milwaukee, Wis., has appointed Graze-Dempsey, Inc., Jacksonville, Fla., to sell and service Bucyrus-Erie ⅜ to 4-yd. shovels, draglines, and cranes in 26 northern Florida counties. The firm will handle the full line of gasoline, Diesel, and single motor electric general purpose excavators; Red Arch dragline buckets; and the all-hydraulic Hydrocrane and Hydrohoe. The new territory consists of the northern portion of the state bounded on the west by and including the counties of Gadsden, Liberty, and Franklin, and on the south by and including Levy, Marion, Putnam, and Flagler counties. Equipment servicing facilities, located at the distributor's modern plant, 1102 Edgewood Ave., will be maintained for the convenience of excavator users. Plans call for a complete stock of Bucyrus-Erie replacement parts. Western Florida will continue to be served by Ray Brooks Machinery Co., Montgomery, Ala.; the central part of the state by Epperson & Co., Tampa, and R. H. Clark Equipment Co., Mulberry; southern Florida by Llwellyn Machinery Corp., Miami.



"A load of stone? Any special size for any special purpose?"

Caterpillar Tractor Co., Peoria, Ill., has announced plans for construction of a new plant. A location has not yet been determined. The new plant will be devoted to the production of the company's line of motor graders and industrial wheel tractors. This move is being made to accommodate at Peoria a broadened program of crawler tractor and Diesel engine manufacture. This enlargement and rearrangement of manufacturing facilities and the construction of the new plant are expected to be completed by the end of 1955. The total cost of new machinery and equipment at all plants, and of land and buildings at the new plant is estimated to be about $45 million.

Chain Belt Co., Milwaukee, Wis., has appointed Richard M. Leek to the newly created position of Mid-Atlantic district representative for its Construction Machinery Division. Leek has been associated with Construction Machinery Division since 1949, and for the last year has done field sales and service work out of the New York Office. His office will be located at 4125 Whitaker Ave., Philadelphia 24, Pa., and his territory will include Pennsylvania, Virginia, West Virginia, Maryland, Delaware, Washington, D. C., and the southern part of New Jersey.

Charles W. Carter Co., Los Angeles, Calif., has been named west coast distributor for the automotive division of the Warner Electric Brake & Clutch Co., Beloit, Wis. The Carter firm is one of the west coast's largest parts and maintenance organizations for the trucking, bus, and automotive industries. It will handle the complete line of Warner electric brakes.

Colorado Fuel and Iron Corp., New York, N. Y., has announced the opening of a new district sales office and warehouse in New Orleans, La., by its Wickwire Spencer Steel Division. Ford L. Brooke, who formerly handled sales of wire rope for Colorado Fuel & Iron in Louisiana, was appointed New Orleans district manager. CF&I's new office will service not only the immediate area surrounding the city, but a territory

THE ONLY MODERN FRONT END ... ON QUARRY SHOVELS

110-B, 4½ cu. yd.
150-B, 6 cu. yd.
190-B, 8 cu. yd.

Convertible Shovels — Draglines

THE new Bucyrus-Erie Ward Leonard electric shovels bring to quarry loading the first important departure from the old-fashioned shovel front end. This advanced design — with two-section boom, inside tubular handle, and quiet positive rope crowd — increases speed and payload. It reduces upper boom weight, puts extra strength in the lower section where maximum strength is needed. It cuts out old-style handle racking and crowd pinions, takes the deadweight of crowd machinery off the boom. And, most important to *you*, it gives you all these field-proven performance advantages:

- **Lighter Weight, Greater Strength** — Two-section boom, with light upper section . . . lower section strut-connected to the A-frame.
- **No Handle Twist** — Inside tubular dipper handle is free to rotate in rubber-cushioned saddle block.
- **No Handle Binding in Saddle Block** — Rope crowd is quiet, positive, eliminates handle racking and crowd pinions.
- **No Dipper Wobble** — Twin dual hoist ropes put hoist power where needed for steady travel of dipper through bank.
- **No Sway Braces** — Widespread boom feet eliminate accessory boom braces or cables.
- **Low Swing Loads** — Advanced front end design, with crowd machinery on deck, cuts dead load on swing, steps up swing speed.
- **High Pay Loads** — Single tubular handle — with improved dipper back connections, dipper trip on saddle block, no dipper bail — reduces dead load on hoist, leaves more power for digging.

311-53C

There's much more to the story, too. Deck machinery, electrical equipment, and mounting all match the front end in advanced engineering and outstanding performance advantages. The full story will convince you that yard for yard, dollar for dollar, pound for pound, these are the finest rock excavators ever built.

Write for Complete Information Today!

BUCYRUS ERIE

BUCYRUS-ERIE COMPANY SOUTH MILWAUKEE, WISCONSIN

comprised of Mississippi, Louisiana, Tennessee, and Arkansas. Located at 7930 Palm St., New Orleans, the new CF&I sales center and warehouse will stock supplies of "Realock" chain link fences, screen cloth, hardware cloth, flanged and dished heads, and general purpose fabric and netting. Wire rope will not be warehoused here.

Dayton Supply & Tool Company, Inc., Dayton, O., has been appointed a distributor for the Carboloy Department of General Electric Co. This marks the first new distributor to be named in 1953, Carboloy's 25th anniversary year. The Dayton company will carry the department's entire line of standard tools and blanks, masonry drills, and diamond wheel dressers. C. F. Woessner, vice president, will direct the sale of Carboloy products.

Detroit Diesel Division of General Motors Corp., Detroit, Mich., has announced several changes in the assignments of its field sales and service personnel. A. W. Anderson, formerly factory sales representative to Detroit Diesel distributors in the New Orleans sales zone has been transferred to the Los Angeles area in the same capacity. He is succeeded by Ralph Pontius, former factory service representative in the New Orleans territory. Stanley Pillsbury, formerly associated with Detroit Diesel's service training activity has been assigned to the post vacated by Pontius. Other reassignments include the transfer of Charles sales representative, to the Tulsa Howell, former Los Angeles area sales office. He will serve as assistant to A. F. Campbell, manager of engine sales to the petroleum industry, succeeding E. J. vanDyk. VanDyk has been transferred to the home office in Detroit as a sales engineering consultant.

Erie Steel Construction, Erie, Pa., has appointed Lloyd Adam sales manager of its Bucket Division. Adam comes to Erie Steel Construction from Erie Engine and Manufacturing Co. where he spent 10 years as general sales manager. Adam began his working career in the physical laboratory of the Erie Works of the General Electric after leaving Thiel College where he majored in Physics. After four years in the laboratory he branched out into specialty and retail selling. In his new position he will devote his time exclusively to the sales activities of clamshell buckets.

Frank G. Hough Co., Libertyville, Ill., announces the appointment of Kenneth B. Larkin as district representative in its sales territory No. 7 comprising the states of Washington, Oregon, Idaho, Montana, and the Canadian Provinces of British Columbia, Alberta, and Saskatchewan. He replaces H. E. Thomas who becomes district representative of sales territory No. 1, comprising the states of Illinois, Michigan, Indiana, Ohio, Kentucky, and Eastern Missouri. Larkin comes to Hough with a civil engineer degree and extensive experience in civil engineering and the construction business. He was formerly associated with Nelson Equipment Co., Hough distributor in Portland, Ore. and Seattle and Spokane, Wash. He is a veteran of World War II.

Galion Allsteel Body Co., Galion, O., has appointed R. H. Tomlinson regional representative. Tomlinson will direct sales and service of Galion dump bodies, hydraulic hoists, and hydraulic tailgates in Kentucky, Alabama, Mississippi, Louisiana, and Arkansas. Prior to joining Galion, Tomlinson was formerly district manager of the Gar Wood Industries.

General Electric Co., Schenectady, N. Y., has appointed the Northern Commercial Co. the first agent and distributor of its apparatus products in Alaska. Northern Commercial will provide off-the-shelf service of small electrical equipment in the cities of Juneau, Ketchikan, Anchorage, Fairbanks, and Nome, and will be backed up by Seattle stocks of larger apparatus.

Hollingshead Corp., Camden, N. J., has announced formation of a wholly-owned subsidiary. The Perry Co., of Camden, manufacturers of cooling system filters. M. M. Perry, who developed the electro-chemical filter, will become president and general manager of the new firm. It succeeds the Perry Filter division of the Spark-o-Liner Corp. of Minneapolis, Minn. Perry, a native of Michigan, attended the University of Illinois and began his career in the automotive field with General Motors Corp. in the Oldsmobile plant at Lansing, Mich. He will be joined in his new position by J. A. Vettel, former sales manager of the Perry division, who will continue in that capacity and serve as a vice president. W. H. Lukens, a 26-year associate of the Hollingshead Corp. and its former sales manager, will become chairman of the board of the new subsidiary. Other officers will include: R. LeKashman, vice president; J. Laputka, treasurer; and P. Jones, secretary.

Joy Manufacturing Co., Pittsburgh 22, Pa., has appointed Frantz Tractor Co., New York City, and East Coast Equipment Co., Mountainside, N. J., as distributors of Joy Construction Equipment. The Frantz organization has sales and service facilities at 2740 Ewen St., New York 63, and at 1110 Fulton St., Hempstead, Long Island. East Coast Equipment is located on Highway 29 at Mountainside, N. J.

Le Roi Co., Milwaukee, Wis., has named John R. Gavigan chairman of the National Construction Machinery Credit Group. Gavigan is assistant treasurer of Le Roi. He was elected to the position at the annual meeting of the group in February. Gavigan, a graduate of Carroll College, joined Le Roi in 1943 as an accountant. He was promoted to assistant treasurer in November 1951.

L. B. Foster Co., New York, N. Y., recently opened a new office in Los Angeles, Calif., to serve the West Coast industrial market. The firm presently maintains offices, warehouse stocks, and rail and pipe fabrication facilities in Pittsburgh, New York, Chicago, and Houston. The new office will be headed by Henry E. Fleishman, vice-president and a member of the Foster organization for 30 years. Fleishman has been general manager of the Chicago office for almost two decades. Foster's new office will serve the states of California, Arizona, Utah, Nevada, Oregon, Washington, Idaho, Montana, and Wyoming. The office

"We're 12 hours ahead of schedule so I gave the boys the day off — makes for good labor relations, eh?"

will be located at Suite 606, 3460 Wilshire Blvd., Los Angeles 5, Calif.

Koehring Co., Milwaukee, Wis., recently appointed Tri-State Equipment Co. of El-Paso, Tex., to handle its complete line of heavy-duty construction equipment. Products of three Koehring subsidiary companies, C. S. Johnson, Kwik-Mix, and Parsons Companies will also be handled. Covering the Western portion of Texas, the Tri-State territory comprises the counties of El-Paso, Hudspeth, Culberson, Reeves, Jeff Davis, Presidio, Brewster, Pecos, and Terrell along with two counties in the State of New Mexico, Dona Ana and Otero. J. B. Gilmer is the sole owner of the Tri-State Equipment.

Martin Machine Co., Kewanee, Ill., has appointed Harold Wahl chief development engineer. Wahl joined Martin after 17 years with the Hyster Co. A graduate of Reed College and Oregon State, Wahl has a varied background in the equipment industry. He has written several articles for national trade papers and, as an artist, has had his designs used on the covers of many magazines. Wahl will supervise new product design and trailer improvement.

Mack Motor Truck Corp., New York, N. Y., has appointed K. L. Fitts manager of off-highway truck sales. Fitts joined Mack in 1945 as a national accounts salesman, and in 1951 was made assistant manager of that division. In his new position he succeeds P. J. Fleming who recently retired.

Marion Power Shovel Co., Marion, O., is announcing the appointment of Tractors, Inc. as new Marion distributor for the entire state of Rhode Island and southeastern Massachusetts. Tractors, Inc., sales and service facilities are located at 128 Naragansett Ave. in Providence. John H. Gorman is president of the firm, J. Bernard Gorman is vice president, and Charles L. Woolley is sales manager.

Nordberg Manufacturing Co., Milwaukee 1, Wis., has appointed Southern Engine & Pump Co. distributor for its 4FS Diesel engines in 117 Texas counties and Southern Louisiana. Nordberg 4FS Diesel engines will be sold and serviced through Southern Engine Pump Co. branches located at Dallas, Edinburg, Kilgore, and San Antonio, Tex., and in Houma, La.; also through offices at Lafayette and New Orleans. Southern Engine & Pump Co. has branches in six Texas and Louisiana cities and executive offices and manufacturing facilities at 900 St. Charles St., Houston. Southern Engine & Pump has purchased property in New Orleans and plans to supplement their sales representation by building another branch office with warehouse and shops in that city.

Pekay Machine and Engineering Co., Chicago, Ill., designers and manufacturers of elevator conveyor buckets, conveyors, sand handling and conditioning equipment, and other devices, has acquired the entire machine shop and production facilities of Pekay Metal Fabricators. The completely integrated and controlled manufacturing set-up which this gives the company is expected to result in substantially faster and better production on the whole Pekay line.

Reo Motors, Inc., Lansing, Mich., announced recently the formation of Reo Truck Leasing, Inc., a wholly-owned subsidiary. The new company will engage in coast-to-coast truck leasing operations. The organization is ready to begin operations at once. Organizational work has been completed in 11 key cities, where Reo leasing offices have been established. Others will be set up in additional major markets throughout the country. Joseph S. Sherer, president of Reo Motors, will head the new leasing firm. Reo's leasing activities will be carried out exclusively by the new company, and will not interfere with regular Reo branch operations. In effect, the leasing company will be a renter of space and prime customer of the Reo branch for vehicles, parts, and service. It will conduct its merchandising program independently of already established Reo outlets. After analyzing the customer's transportation needs scientifically, Reo will lease trucks for a specified period, and at a fixed weekly charge plus mileage. Reo will maintain the fleet in good repair, on a 24-hour-a-day, seven-days-a-week basis, and in good appearance for top advertising value while the trucks are before the public.

St. Paul Hydraulic Hoist, Minneapolis, Minn. has appointed Leo M. Brown sales manager. Brown previously served as assistant sales man-

Down Go Field Expenses!
Expenses are cut to the bone when you have Omaha Dragline Buckets in the field. Forty-two years of testing and improving have produced Omaha buckets built to last and last! Reinforced at points of strain these buckets stand up under the toughest jobs—reducing the need for time- and dollar-consuming field repairs. Write now for complete catalog giving specifications of 4 available types.
Of Course
IT'S AN
OMAHA
DRAGLINE BUCKET
DRAKE-WILLIAMS-MOUNT • OMAHA, NEBR.

ager at St. Paul Hoist and prior to that was a district manager serving St. Paul distributors in the south central states. Before joining Gar Wood in 1949, Brown was employed as a construction engineer for E. I. Du Pont & De Nemours and sales manager for Truck Equipment Co., St. Louis, Mo. Brown succeeds William F. Keeton who has resigned.

Sauerman Bros., Inc., Chicago, Ill., has appointed Martin Meyer as general sales manager to fill the vacancy caused by the death of Dwight D. Guilfoil on May 3. Meyer joined the Sauerman organization in 1953. He has been assistant sales manager since 1948 and is a Director of the company.

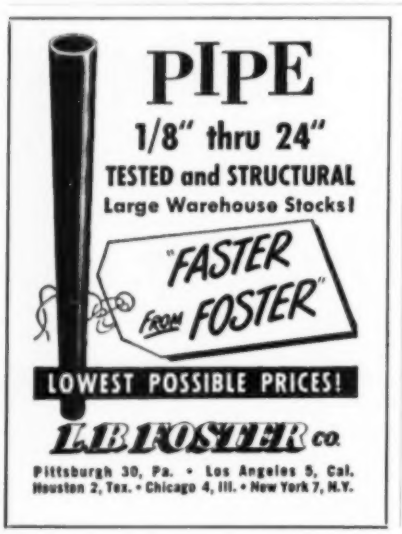
Templeton, Kenly & Co., Chicago, Ill., manufacturer of Simplex mechanical and hydraulic jacks, has consolidated its New York domestic and export offices. E. A. Zimmerman will direct both operations in new quarters at 60 E. 42nd St., Room 2119, New York 17, N. Y. Zimmerman, who was previously manager of New York domestic sales, has been long associated with Simplex jack sales and service.

United States Rubber Co., Rockefeller Center, New York 20, N. Y., has announced the appointment of John F. Arthur, formerly district manager of the San Francisco branch, as manager of U. S. truck tire sales. Arthur will make his headquarters in the company's general offices in Rockefeller Center, N. Y. Richard M. Payson, formerly manager of farm market sales, will succeed Arthur as district manager of the San Francisco branch. John W. Carpenter, formerly district manager of the Fisk-Gillette division in New York was appointed district manager of the Denver branch. John F. Arthur graduated from Washington State College. He started with U. S. Rubber in Seattle in October 1945, as a truck tire salesman. Successively he has held the positions of assistant district manager of the Seattle branch, district manager of the Seattle branch, and district manager of the San Francisco branch. Richard Payson attended Suffolk University. After service in the U. S. army during world War II, he joined the rubber company as a U. S. tire salesman in Boston. He was named district manager in Springfield, Mass. in 1948 and district manager in the Detroit branch in July 1949. He became manager of farm market sales in January 1952. John W. Carpenter attended Texas A. & M. He started with the rubber company as a U. S. tire salesman in Dallas, Texas in 1936. He became district manager for Gillette tires in Memphis, Tenn. in May 1942, assistant sales manager for Gillette tires in October 1947, and district manager of the Fisk-Gillette division in New York in August 1949.

Viber Co., Burbank, Calif., has appointed Lee Redman Equipment Co., Phoenix, as Arizona distributor for the complete line of internal and external vibrators. Redman Equipment Co. will carry a complete line of new units and replacement parts at 610 S. 19th St.

Wooldridge Manufacturing Co., Sunnyvale, Calif., has set up a factory parts depot in Atlanta, Ga. The move is part of a continuing program of the manufacturer to provide more rapid parts replacements to Wooldridge equipment owners and dealers throughout southeastern and central states. Parts inventories will be maintained for Terra Cobra self-propelled earthmovers, Wooldridge scrapers, power control units, rippers, bulldozers, and other earth-moving equipment. The new parts depot has been established in cooperation with Statham Machinery & Equipment Co., Wooldridge distributor, at 671 Ford Place, N. E., Atlanta, Ga. To provide assistance to the various Wooldridge distributors throughout the area, factory sales and service representation will be maintained in connection with the Atlanta parts depot.

Warner & Swasey Co., Cleveland, O., has announced the following sectional appointments: Willis C. Burton as Gradall service representative for the *Middle Atlantic* region. A graduate of Fenn College, Burton will serve the area from southern New Jersey to North Carolina, making his headquarters in Upper Darby, Pa. . . . Don Dawley has been appointed Gradall service representative for the *New England* area. Dawley will serve New York state and northern New Jersey in addition to the New England states.


PIPE
1/8" thru 24"
TESTED and STRUCTURAL
Large Warehouse Stocks!
"FASTER FROM FOSTER"
LOWEST POSSIBLE PRICES!
LB FOSTER Co.
Pittsburgh 30, Pa. • Los Angeles 5, Cal.
Houston 2, Tex. • Chicago 4, Ill. • New York 7, N.Y.

OLD FAVORITE —
YAUN'S DRAGLINE BUCKET
Thousands of contractors depend on Yaun Dragline Buckets for easier handling, faster dumping and greater profits. This is the bucket that built our reputation for "More Yards with a Yaun". Now better than ever, with hard MANGANESE steel fittings, it comes in three basic models, sizes from ⅜ yard up.
THE NEW LEADER!
YAUN'S CLAMSHELL BUCKET
Yaun's CLAMSHELL bucket is preferred by many. Stronger, faster and tougher than competitive buckets, it's all-welded, with hard MANGANESE steel cutting edges. Sized from from ¼ to 6 yards, three weights to choose from.
For information, write Bucket Department Room 204
YAUN MANUFACTURING CO., INC.
BATON ROUGE, LA.

TO ADVERTISE: All advertising in this section is payable in advance. Rate: $1.00 per line, or $12.00 per inch of 12 lines. Minimum charge $4.00. No discounts; no commissions. Please count your copy carefully to avoid delay. Each line contains 41 characters 134 characters if all capital letters are used). Count spaces and punctuation as one character each. Allow 10 characters for box number, if blind advertisement is desired. Be sure to enclose the correct amount of money with your order. Closing date—15th of preceding month. Example: January closes December 15th.

TO INQUIRE: Be sure to address your inquiry to the advertiser by using the correct box number. Mail your letter in care of Excavating Engineer, South Milwaukee, Wisconsin. Write each advertiser a separate letter. Do not write us for name and address of advertiser. This information will not be given out. We have no information about the equipment advertised other than that shown in the advertisements themselves.

LARGE SHOVELS, CRANES, DRAGLINES—2½ YDS. & UP

Lima Model 1201 combination 3½ cu. yd. shovel and dragshovel with 80 ft. boom and fair-leads but no bucket. Powered by Model 1 Cummins diesel engine rebuilt 1953. Caterpillars rebuilt, new dipper and dipper handle. Caterpillars extra long and extra wide. Machine Serial No. 3639.

Stuart M. Christhilf & Co., Inc.
134-136 West Mt. Royal Ave. Baltimore 1, Md.
Phone Lexington 4313

2—9-W Bucyrus Monighan Draglines.
1—5-W Bucyrus Monighan Dragline.
1—200-W Bucyrus Monighan Dragline.
1—120-B Bucyrus Elect. Dragline & Shovel.
1—44-B Bucyrus Dragline & Shovel.
1—9-W in Ohio—others in Wash. & Idaho.

J. A. TERTELING & SONS, INC.
Box 1428 Ph. 4-3576 Boise, Ida.

Bucyrus-Erie Model 3-W Walking Dragline, Serial No. 599, 90 ft. boom, Caterpillar diesel engine. H. F. Hardwick Company, Beardstown, Illinois.

P. & H. Model 855, 2 yd. shovel serial #12661, 24' boom, 17' stick, 30" tracks. G. M. Model 6-71 Diesel engine. Electric starter, 1500 Watt Kohler light plant w/Wisconsin 4 cyl. water cooled engine. Machine new 10-22-48. Also dragline attachment with 50' boom and 2 yd. bucket. Price $35,000.

P. & H. Model 255, ¾ yd. shovel, serial #13301. 18' boom, 13" stick, 20" rtacks. P. H. supercharged Diesel engine 1500 Watt light plant, 125 volt, 1 cyl. air cooled engine. Machine new Sept. 1948. Completely rebuilt and has not been used since rebuilding. Excellent condition. Also some spare parts included. Price $12,000.
Box 3539

Page 625 diesel walking dragline. 150 ft. boom. 9 cu. yd. bucket, 4 years old. Good operating condition. Price $150,000. Loaded on cars. Location Middle East. Box 3486

Bucyrus-Erie 120-B dragline excavator, full electric Ward Leonard control. Serial No. 23065 with 100-ft. boom special cast manganese steel. 48-in. wide track pads including 4½-yd. heavy duty Esco mining bucket serial no. 4130 or a special 6-yd. Esco bucket serial no. 1367 including 940-ft. rubber covered 2300 volt power cable. Located in California.

Thurman and Wright
625 Market St. San Francisco, Calif.
Phone EXbrook 2-8260

FOR SALE

Lima 1201 Dragline. Serial No. 4527. New in 1948. One owner. Good condition.

Comet Collieries, Inc.
P.O. Box 11 Linton, Ind.
Phone 1137

Page 625 Electric Walking Dragline, 150-ft. boom, 9-cu. yd. bucket. Excellent operating condition. Price $150,000 f.o.b. cars. Located Middle East. Box 3504

Koehring model 1005 Diesel shovel, 2½ cu. yd. dipper. Delivered new, 1949. Located south central Missouri. Immediate delivery.
Box 3493

Bucyrus-Erie 120-B Shovel serial no. 15941, with 5 yd. Esco dipper. In good operating condition. Location—West Coast. Price $100,000 F.O.B. cars.

Permanente Cement Co.
Permanente, California

Two Marion Model 111-M GMC Diesel draglines, 90' boom, 4 yd. bucket; shipped new 1947; good condition; will consider any reasonable offer for quick sale. Located Eastern Oklahoma. Box 3544

SMALL SHOVELS, CRANES, DRAGLINES—UP TO 2½ YDS.

H-2 Hydrocrane, serial No. 1169 mounted on International Model K5, truck chassis No. 83507, engine No. GRD 233—147568; truck has 7.00 x 20 Firestone tires, very little wear; truck has 1900 mi., good condition. Unit has clamshell bucket and tagline never used; can be seen Wilkes-Barre warehouse; price: $4,500. Cleveland Brothers Equipment Co., Route 309, Wilkes-Barre, Pennsylvania.

SHOVELS—CRANES—DRAGLINES

1950 38-B clam-drag GM diesel wide cats. Two Model 6 Northwest clam-drag 33" cats. Murphy Diesels 1952 models like new. Two Model 95 Northwest crane-drags 75 ft. booms. Murphy Diesels—light plts-bkts—late models. Two new Model 25 shovels—wide cats-diesels.

Sales—Rentals

J. C. French, 226 Berry Pkwy., Park Ridge, Ill.
Tel. TAlcott 3-4927

One Model 605 Koehring shovel, 1½ yd.; Ser. No. C6821; powered with G-M diesel; approximately 5 yrs. old; excellent condition.
One Model 6 Northwest dragline, 1½ yd.; powered with Cat. Diesel; 55' boom.
One Model L-S 50 Link Belt, 1½ yd.; combination crane and dragline; 45' boom; Rudomatic Tagline; Cat. Diesel. Machinery and Supplies Co., Inc., 2000 Walnut Street, Kansas City, Missouri.

Bucyrus-Erie 15-B, standard ½ yd. shovel, rebuilt Buda gasoline engine, available approximately July 1, 1953. Now in daily use and may be inspected in operation. Price, on cars Middle Georgia shipping point, $6500. R. S. Armstrong & Bro. Co., 676 Marietta St., N. W., Atlanta 3, Ga., Phone Lamar 6434.

¾ yd. Byers No. 83 clamshell, dragline (less bucket and backhoe attachments), new January, 1947, GM-371 engine, 40-ft. boom, 24-in. treads. In good operating condition.
Box 3532

Bucyrus-Erie Model 15-B No. 59820 Combination 40' boom, dragline, clamshell and dragshovel, diesel-powered, complete with drag and clam buckets. Excellent condition, located Springfield, Missouri. Write or phone Machinery & Supplies Company, 2000 Walnut Street, Kansas City, Missouri, Victor 5457.

10-B ⅜-yard Bucyrus-Erie Dragline, Serial 21575, with Buda gas power, 35-ft. boom, ⅜-yard Red Arch Bucket. Completely overhauled. In excellent shape. $6,000.00.
Box 3517

P&H 1055 L.C. 4 yd. Dragline; 100 ft. boom using 3 yd. Bucket; Buda Diesel; excellent operating condition; priced right. Other mining equipment for sale. Located in Midwest. Write Box 1072, Minot, North Dakota.

1 Bay City Model 65—1¼ yd. Shovel Cummins Diesel. 3 yrs. old. Overhauled March, 1953. Location, Indiana. Very good operating condition. Box 3533

54-B Diesel Bucyrus-Erie Shovel, Serial No. 35011; price: $22,500 F.O.B. cars. Inspection can be made at the Douglas Mine, Chisholm, Minnesota.

10-B Bucyrus-Erie ⅜-yard Dragline, Serial 12427, powered by Allis-Chalmers gas. Complete with 28-ft. boom, ⅜-yard bucket. Completely overhauled. $5,000.00
Box. 3518

MISCELLANEOUS EQUIPMENT

BOTTOM DUMP EUCLIDS

13-Model 25FDT Euclids, S/N's 4727, 4728, 4729, 4866, 4868, 5569, 5570, 5828, 5829, 6813, 8365, 8367, and 8566. All are equipped with 150 HP Cummins Diesel Engines.

E. F. CRAVEN COMPANY

P.O. Box 538 Phone: 3-5521

Greensboro, N. C.

Bucyrus-Erie 15-B Miscellaneous Parts.
Northwest No. 25 and No. 6 Boom Point Sections.
Osgood 200 Shovel fronts.
International TD-18 Tractor & Hydraulic Dozer.
Box 3536

43-B Serial No. 16036 Dragline, 65 ft. boom, 2 yd. Page Bucket. Reported in excellent condition. Price $15,000 as is.
40 Lorain Shovel and Dragshovel. Machines can be inspected at Kulpmont, Pa. c/o Jim Hanlon.

Cat. D-4 w/side boom; Cat. D-4 Angledozer, 6U-660, reasonable; Cat. D-6 Angledozer, just had major overhaul, $6500; Cat. D-6 front end loader, perfect, $6500; Cat. D-8, 2U 5165 w/Cat. Straight blade and No. 25 DDPCU $6000; Cat No. 12 motor patrol w/Scarifier, cab, starter, 8T-1481, $400; Bucyrus-Erie 38-B shovel, GM Diesel, perfect; Lorain Model 80 shovel No. 9622, excellent; Gallon 10 ton 3 wheel roller, like new; Cleveland Model 95 Trencher; Unit 514 Backhoe; TD-9 Angledozer, $2750; Oliver Front End Loader $1700; HD-10 and HD-14 Angledozers $1500 each. Air Compressor Rental Co. 19615 Nottingham Rd. Cleveland, Ohio, Kenmore 1-8000.

Continued on page 80

DISPERSAL SALE

All equipment, tools, supplies, etc. Killian-House Company, general highway contractors, San Antonio, Texas.

Power Shovels	Air compressors
Draglines	Paving breakers
Tractors	Trucks
Bulldozers	Trailers
Motor graders	Dump trucks
Rollers, various types	Tires & tubes
Woodsters	Water trailers & trucks
Asphalt & concrete equip.	Miscellaneous tools

and many other items

Sale closes August 22, 1953

For complete list and terms of sale, write:

W. R. SMITH, Receiver

Killian-House Company

1003 National Bank of Commerce Building

San Antonio 5, Texas

Euclid Loader Model BV — Cummins Diesel Power, condition practically new. Contact Mr. T. Kowski, Central Teaming Co., 8701 Burley Ave., Chicago 17, Ill.

Slightly used Bucyrus-Erie 44-B two cu. yd. shovel bucket. Excellent condition. Price $1500 f.o.b. New Haven, Conn. Write The W. I. Clark Co., New Haven, Conn.

One Paulin altimeter and one Wallace & Tiernan altimeter. Excellent condition. W. H. Stewart, 320 East Maple Road, Indianapolis, Indiana.

D-17000 Caterpillar Engine. Excellent condition. Approximately 1,000 hours since major overhaul. $5,000.00. Collins Pondosa Lumber Co., Pondosa, Ore.

13 Federal Trucks equipped with 150 hp. Cummins Diesel Engines with 30 cu. yd. semi-trailers, end dump.
4 Federal Trucks powered with 150 hp. Cummins Diesel Engines with 20 cu. yd. bodies, end dump. Reasonably priced. Located Ohio. Box 3542

4 Steam rod type locomotives; two 120-ton 2-8-0, one 90-ton 0-8-0, one 80-ton 0-6-0. W. J. Crawford, Algers, Winslow & Western Ry. Co., Oakland City, Indiana.

10-B shovelfront, twin rope crowd type. Overhauled, in good operating condition. Immediate shipment from Atlanta. R. S. Armstrong & Bro. Co., 676 Marietta St., N. W., Atlanta 3, Ga. Phone Lamar 6434.

One new 15-B 30-ft. dragline boom including boom cable and fairleads, less hoist cable and mounting pins. Contact Jas. W. Bell Co., P.O. Box 550, Cedar Rapids, Iowa.

ROGERS LOW BED 50 ton trailer with WKB12 International tractor and winch.
SHOVEL FRONT 2½ yd. for Manitowoc 3500, 35' boom, 27' sticks. NEW!
SHOVEL FRONT for Model 700 P & H, used.

EDWARD R. GEE
P.O. Box 5575 — Philadelphia 43, Pa.
Phone: GRanite 4-9537

Slightly used Bucyrus-Erie No. 8 Bit Sharpener, oil fired heating furnace and bit quenching tank with tilting racks. For price and other details write Box 3534.

WANTED TO BUY

New NORTHWEST 80-D or late Series slightly used. All Tractors and Equipment. Top prices paid. Send offers to: RETIG DISTRIBUTORS, 505 5th Ave., New York, N. Y.

POSITIONS WANTED

Superintendent available. 30 years experience and qualifications covering hi-ways, airports, large sewers, water lines, heavy and light excavating; all types. Know cost and modern equipment. Sober, honest, and reliable. Box 3535

20 years experience as machine shop foreman, master mechanic and superintendent of strip coal mine operations, excellent references. Box 3545

and will make his headquarters in Warner & Swasey's East Orange office. . . . Herman A. Kraus has been placed in charge of Gradall sales for the *Southwest*. Kraus, with headquarters in Houston, Tex., will cover the states of Texas, New Mexico, Oklahoma, Arkansas, and Louisiana. He has been with Warner & Swasey's Gradall division for the past five years. Stanley Adams has been named service representative for the area, and will also headquarter in Houston. A graduate of Miami University, Adams joined Warner & Swasey at its Gradall plant in New Philadelphia, O., in 1950. . . . Frederick A. Strine has been placed in charge of Gradall sales for the *midwest* area. Strine, with headquarters in Chicago, will cover the states of Illinois, Wisconsin, Minnesota, Missouri, the Dakotas, Wyoming, and Colorado, as well as Iowa, Kansas, and Nebraska. Harold R. Carrol has been named service representative for the area, and will also headquarter in Chicago.

Wood Manufacturing Co., North Hollywood, Calif., manufacturers of mix-in-place roadbuilding equipment, announces the appointment of the following distributors: Illinois Contractors Machinery, Inc. of Melrose Park and Peoria, Ill., for Northern Illinois and Lake and Porter Counties in Indiana; Stockberger Machinery Co. of Fort Wayne and Indianapolis, Ind. for the state of Indiana, excluding Lake, Porter, Harrison, Floyd, and Clark Counties; and Machinery, Inc. of St. Louis, Mo., for Southern Illinois and Eastern Missouri.

Harnischfeger Corp., Milwaukee, Wis., has appointed W. E. Hawkinson, Jr., sales manager of its large excavator division. Hawkinson joined Harnischfeger as a sales trainee in July 1941, after graduating from the University of Wisconsin. Upon completion of his training, he entered the export repair sales department. From 1942-46, Hawkinson served with the army. He returned to Harnischfeger in 1946 as a sales representative, and in 1950 became district representative in southeast Asia and Pacific area.

Cummins Engine Co., Inc., Columbus, Ind., has organized the Cummins Rio Grande Sales and Service, Inc., to handle the former Albuquerque, N. M. and El Paso, Tex., operations of Cummins & Moran, Phoenix, Ariz. The president of the new Southwest Cummins Dealership is A. S. Leonard. J. D. Dennedy is vice president. Headquarters for Cummins Rio Grande Sales and Service is at 1921 North Broadway, Albuquerque, with a branch operation at 600 Cole St., El Paso.

Four Wheel Drive Auto Co., Clintonville, Wis., has appointed G. F. DeCoursin to the position of General Sales Manager. DeCoursin came to FWD in 1936. Starting in the factory, he was rapidly promoted from one position to another, involving purchasing, production, and product application. In 1945 he was made manager of the standards department.

Another Example of Efficient Power at Lower Cost

Owned by the Atlas Construction Company, Waxahachie, Texas this Bucyrus-Erie model 200-W walking dragline is shown on a canal operation in Louisiana. This unit is powered by a Cooper-Bessemer diesel engine.

LONG-RANGE STAMINA

ANOTHER Cooper-Bessemer BONUS VALUE

Wherever you go, wherever heavy duty diesels are at work, you'll find Cooper-Bessemers have earned a reputation for exceptional stamina. Or, call it endurance! It means continuous operation, year-in, year-out, with a very minimum of down time and maintenance.

That's the kind of diesel performance that means extra profit in your pocket. It pays off in draglines, in marine, locomotive and stationary power service . . . wherever heavy duty power is used. Why not get *all* the facts on the Cooper-Bessemer features that can cut costs in *your* particular service? The nearest Cooper-Bessemer office will be glad to cooperate in every way.

The
Cooper-Bessemer
Corporation
MOUNT VERNON, OHIO — GROVE CITY, PENNA.

New York Washington, D. C. Bradford, Pa. San Francisco Houston, Dallas, Greggton, Pampa and Odessa, Texas Seattle Tulsa Shreveport St. Louis Los Angeles Chicago Caracas, Venezuela Cooper-Bessemer of Canada, Ltd., Halifax, Nova Scotia Gloucester, Mass. Calmes Engineering Co., New Orleans, La.

Bought one DW21, reordered 6 more in 14 months!

DAVE GUSTAFSON & CO., INC.
HIGHWAY CONTRACTORS

502 EAST SIXTH — PHONE 9-3951 — SIOUX FALLS, S. D.

January 9, 1953

Caterpillar Tractor Co.
Peoria,
Illinois

Gentlemen:

Our experience in the contracting business dates back to 1926. Our original equipment consisted of one Caterpillar Model Sixty Tractor.

When Caterpillar came out with the DW10 rubber-tired Tractor, we bought two of these units with scrapers as we felt that moving dirt on rubber-tired rigs was a better way of getting the job done. Caterpillar didn't let us down!

In July of 1951 we bought our first DW21 Tractor-Scraper outfit. The performance of this machine was so good that we added two more units in February 1952. Since that time we have purchased four more DW21 Tractor-Scraper outfits; two in April and two more in September of 1952 for our road building projects in South Dakota, because we have found that this is the cheapest method known today for handling dirt on projects such as ours.

When we bought the two DW21 Tractor-Scraper units in September we had just started work on a sub-contract from Peter Kiewit Sons Co. for grade construction of the "four lane highway" from Weaver Airforce Base to Rapid City, South Dakota, consisting of 650,000 cubic yards to be moved in 90 calendar days. Hauls on this job ranged from 400 feet up to 2 1/4 miles one way. Working a single ten hour shift, six days a week our DW21s really put it across on time.

In addition to our DW21s, we have ten Caterpillar crawler Tractors, and five Caterpillar No. 12 Motor Graders.

Our DW21s have the power and stamina to stay on the job and keep the dirt "moving" without costly breakdowns and delays. We feel that Caterpillar performance is second to none and is backed up by the best parts and service facilities to be found.

Very truly yours,

DAVE GUSTAFSON & CO.

L. S. Malm

L. S. Malm
Vice President

Dave Gustafson & Co., Inc., of Sioux Falls, S. D., bought its first Caterpillar DW21 and Scraper in July, 1951. By September, 1952, it had a fleet of 7 of these earth-eating Cat* units.

Why?

L. S. Malm, vice president of the company, has a telling explanation:

"We have found this is the cheapest method known today for handling dirt on projects such as ours."

Don't keep throwing good money after bad on less capable earthmoving equipment. Have your Caterpillar Dealer demonstrate the money-saving advantages of having DW21s on your side.

Caterpillar Tractor Co., Peoria, Illinois.

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